THE TRADE REVIEW

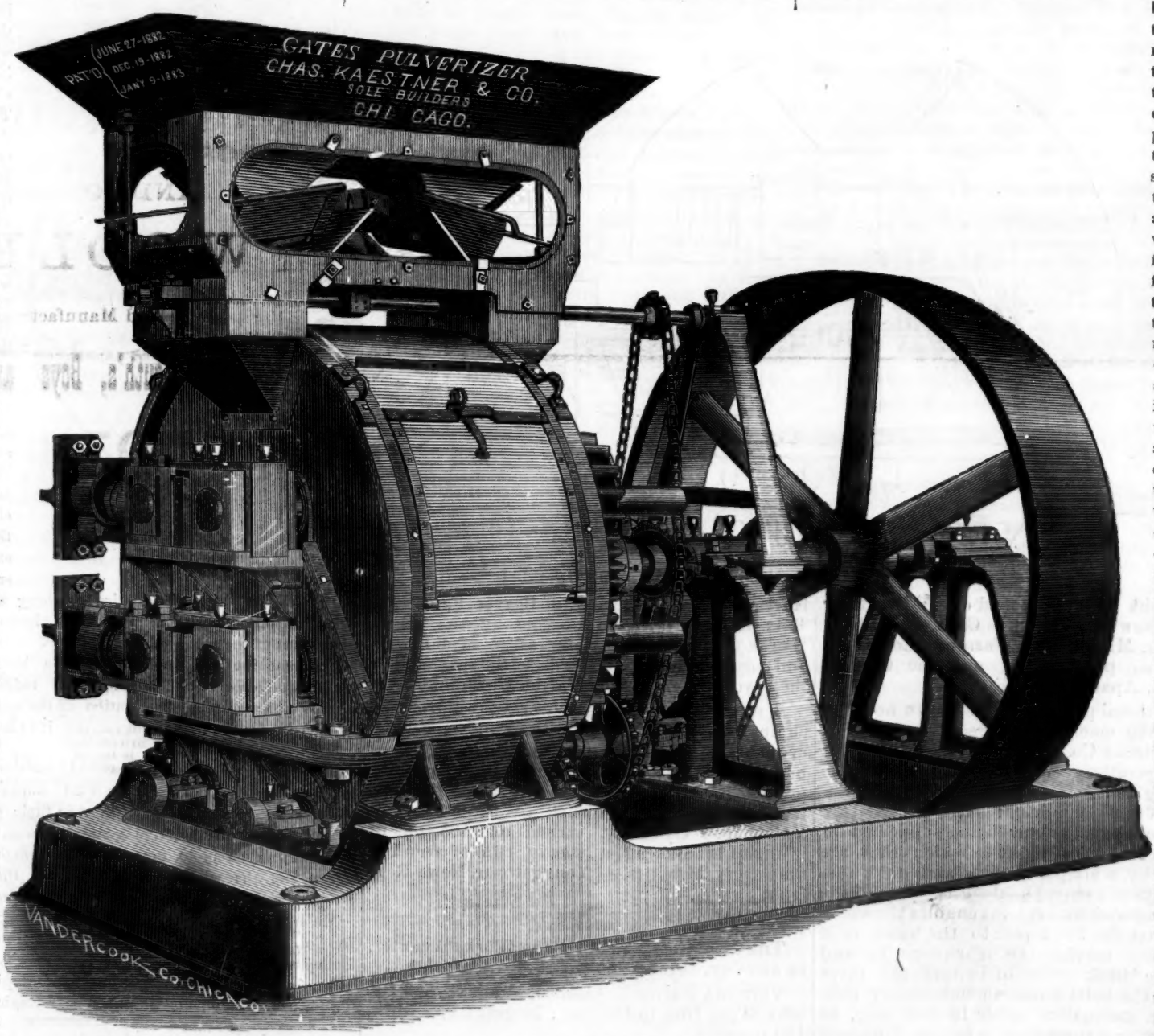
AND WESTERN MACHINIST.

WEEKLY EDITION, Vol. XVI—No. 44. } CLEVELAND, O., NOVEMBER 17, 1883. { MONTHLY EDITION Vol. I.—No. 11.

New Machinery.

The Gates Patented Pulverizer.

We are indebted to Messrs. Charles Kaestner & Co., the extensive machinery builders, No. 303 to 311 South Canal street, Chicago, for the two illustrations of their Improved Gates Pulverizer and Ore Crusher which we furnish on this page. Many styles of machines are now being brought to public attention to take the place of the old and expensive stamp mill system in pulverizing ores, but while most of them are as yet mere experiments the Gates Patent Pulverizer has passed the experiment or trial stage, and is already adopted and in use by numbers of leading concerns rendering it no longer a question as to the successful treatment of ores by pulverizing, and that the system is entirely superseding the more expensive and slower stamp mill system. The Gates Pulverizer is in successful operation by the Portland Consolidated Mining and Milling Company, Deadwood, where a recent experiment gave results as follows: 2½ tons per hour thro' a 40 mesh screen, 2 tons per hour thro' a 60 mesh, and 1½ tons through an 80 mesh. The machine has continuous operation, but shows no wear. Eight other crushers have been contracted for from observations of the workings of this one. Those having mining developments in prospect will do well to make a careful examination of the operation of this pulverizer. It will be seen at a glance by those at all familiar with the crushing of ores and their reduction to powder or any degree of fineness that Messrs. Kaestner & Co. have put into shape and combined in one machine principles which are proving successful, thus placing the pulverizer beyond question or suspicion of experiment.



THE GATES' IMPROVED PULVERIZER.

The use of rollers for crushing is now quite as well understood as the more expensive stamp mills. The objections heretofore raised, where one or more sets of rollers have been used, to thoroughly complete the reduction of refractory material and ores has been the large plants of machinery, comprising rolls, revolving screens, elevators, conveyors, shafting, pulleys, etc., necessary in order to give capacity, and to receive and dispose of the materials during and after the crushing process, making a plant expensive—liable to get out of repair in some of its parts, and filling the mill and machinery with dust.

It will be observed that in this machine the manufacturers fully overcome all these objectionable features, the whole operation of pulverization being performed in the dust-proof case, with which the rollers, revolving screen and elevators are surrounded. They have taken the precaution to place all journal bearings and driving gearing on the outside of the case, so that there is no possibility of unnatural wear caused from dust.

The rollers are adjustable, easily gotten at, and can be removed and replaced in a very short time. The wearing surfaces on the rolls are made in shells of best Franklinite chilled iron, bored taper to fit over the body of the rolls, where they are held in place by two bolts passing through them longitudinally.

The screen, of any desired mesh, is on the periphery of the revolving elevator, where it is held by an ingenious hoop device, which can readily be removed so that the work of changing them is very easily and quickly accomplished. As all the wear to the machine must come on the false shells of the rollers and the revolving screens, it will be seen that the repair account on the machine must be very small when the quantity and quality of work accomplished is taken into consideration. It will be seen from the sectional cuts and the working description of the machine, that it is entirely automatic in its working. That it requires no special skill to run it. That it can be taken apart and set up by any fair mechanic. That anything fed into the machine cannot come out unless it is thoroughly pulverized so that it will pass through the screen surrounding the rollers. While the makers have retained the rollers in their machine they have also combined with them an entirely new principle in feeding them, and that by means of their revolving elevator and screen. This keeps a constant stream or sheet of partially reduced ore passing through the rollers in connection with the new material which is constantly being fed in to upper rolls. Thus they secure the full crushing capacities of the entire surface of the rollers, added to which is the fact that by feeding in the fine with the coarse material a constant solid sheet is formed, which acts as a crusher of itself, thus giving the increased capacity of the material crushing itself on the way through rolls. In so doing they avoid all grinding, and increase the capacity over six fold.

It will be seen by reference to the illustrations, as shown in the section and side elevation, that the pulverizing mechanism consists of two sets of rolls D, placed one above the other, and driven by a single outside gear-wheel on the pulley-shaft. After having been brought down to a suitable size in ordinary crushers, the material to be pulverized is put into a double hopper, from which it is distributed by a simple self-feeding arrangement, shown in the drawing, to the upper set of rolls. Passing through these, it drops on the table shown in the section, and is delivered to the lower set of rolls, by which the bulk of it is reduced to the

Continued on Page 2.

Manufactures.

CLEVELAND.

BEECHER & SMITH report orders ahead of their capacity on their Beecher furnaces.

THE Standard Oil Co. has recently released a a considerable proportion of its machinists on account of slack work.

ABOUT 105 barrels of cement are produced daily at the works of the Ohio Cement Co., of Cleveland, near New Lisbon.

HILL, CLARKE & Co., the Eastern agents for the Cummer Engine Co., have just sent in another order for a 55 H. P. Cummer engine.

THE right of way for the Valley Branch road to the Cleveland Rolling Mills has been secured, and the branch will now very soon be completed. —[South Cleveland Advocate.

THE Brown Hoisting and Conveying Co. expect soon to bring out their new automatic system for charging blast furnaces, ovens, kilns, etc. The whole work is done by machinery.

MR. WM. MILES, agent for the Cummer Engine Co. at the Louisville Exposition, has just sent in an order for a 70 H. P. engine, making the third order that he has taken within a month.

J. E. HART, prominently identified with the business interest of the South, visited the Louisville Exposition, examined all the engines in operations there, and finally ordered a Cummer engine with outfit complete.

RECENT sales by the Cummer Engine Co. have been as follows (in addition to those already-mentioned): George Worthington & Co., Cleveland, Detroit Brush Electric Light Co.; Toledo Brush Electric Light Co. (the second one); Dudderar & Pollard, Newbern, Tenn.; Case & Willard, Battle Creek, Mich.; S. D. Warren & Co., Cumberland, Me., paper mills, and the Cypress Lumber Co., Apalachicola, Fla.

THE additional plant of three Brown hoisting and conveying machines ordered by the N. Y., P. & O. Railroad Co. for its ore dock has just gone into operation. We are indebted to the Engineering and Mining Journal for this description of the apparatus: The bridges are each 180-foot span, the ends being supported on piers which rest on a track to which they are firmly held by a simple device, and on which the tramways are movable along the line of the dock. A ball-and-socket joint enables the workmen to adjust the front pier to the hatch of a vessel without moving the rear pier. In and between the back piers of two of the three bridges are the hoist-house and machinery, consisting of a locomotive boiler 16 feet long, 48 inches shell, and three double acting four-inch cylinder hoisting drums (Webster, Camp & Lane Machine Co.'s make), one of which is arranged at a right angle with the other two and with the line of movement of the piers, so as to allow the one bridge to be moved independently of the other two, which are connected and contain the hoist plants. All of it moves together, and can be driven along the track by one man at each pier turning the crank of the gearing arranged for that purpose. The bridges and piers present a very neat appearance. The trusses are of the inverted parabolic bow-string type, and the size and position of each part are designed and calculated with mathematical precision with reference to the duty each has to perform, a large allowance being made for safety. As the machine and bucket works within the space occupied by the truss, and the height of clearance is the maximum hight of ore that the dock can safely sustain, the full width of the dock can be filled by t e machine operated by one man in the hoist-house. The size of bucket used is one gross ton capacity, and the speed in handliug is only limited by the rapidity with which the men on the vessel can fill the buckets.

OHIO.

MANUFACTURERS of mowers and reapers in this section deny that any consolidation of their interests is intended, or possible.

MACHINERY to the amount of from $6,000 to $7,000 will be put in the Lorain flouring mill by S. W. Hecock, the new proprietor.

SPANGENBERG, PENDLETON & Co. are reaping good results from their Louisvile Exposition exhibit. They have sold several orders in the South, and have many in prospect. The shops are running in good orders.—W. B. Burke & Co. sold 125 tons of their patent grate bars during the past past 60 days. The bars are manufactured at Spangenberg, Pendleton & Co.'s foundry—On Friday the Ætna Machine Works sold a 75 horse power engine to the Hartman Steel Company, of Beaver Falls, Pa. This is the third engine sold by the Ætna Works to the same parties inside of 60 days and speaks louder than words, of the satisfaction their work is giving.—[Warren Chronicle.

A FORCE of men are at work rebuilding the chain works at West Middlesex, destroyed by fire last week. The main building will be of brick with slate roof to render it as near fireproof as possible.—During one day this week the Hannan furnace, owned by the Mahoning Valley Iron Company, turned out 105 tons of iron and is making a steady run of over 100 tons every 24 hours.—[Youngstown News-Register.

IN GENERAL.

THE New Castle (Pa.) Tube Works recently, in one day, turned out 437 three-inch tubes.

VICTORIA Furnace, Goshen, Va., made 3,100 tons of pig iron in October; largest day's work, 130 tons.

THE rolling mill at Greenville, Pa., has again closed, and the proprietors decline to state when the fires will be lighted again.

THE Neshannock furnace, New Castle, Pa., with 18 acres of land, has been sold by Reis Bros. to A. L. Crawford for $95,000.

CITICO Furnace, near Chattanooga, Tenn., is nearly finished. The furnace stack is 75 feet high. All the modern improvements are to be used.

THE patent steel toe-calks manufactured by C. F. DeWick & Co., 360 Dorchester avenue, Boston, Mass., are distinguished by uniformity in quality, superior welding and neatness and elegance of design. This firm has carried on business in Boston 15 years and ship to nearly every State.

WE learn that in the action of "Otto vs. Ashbury, Sumner & Co." "Otto vs. Ogden," and "Otto vs. Bickerton & Co." all of which were brought by Mr. Otto to restrain infringement of his patent No. 2081, 1876, the respective defendants have submitted to orders for a perpetual injunction in terms similar to those of the judgment given by Court of Appeal in favor of the same plaintiff in the action of "Otto vs. Linford" and further that in the similar action of "Otto vs. Whittaker" judgment has also been obtained for an injunction.—[Engineering, Oct. 19.

The Gates' Patented Pulverizer.

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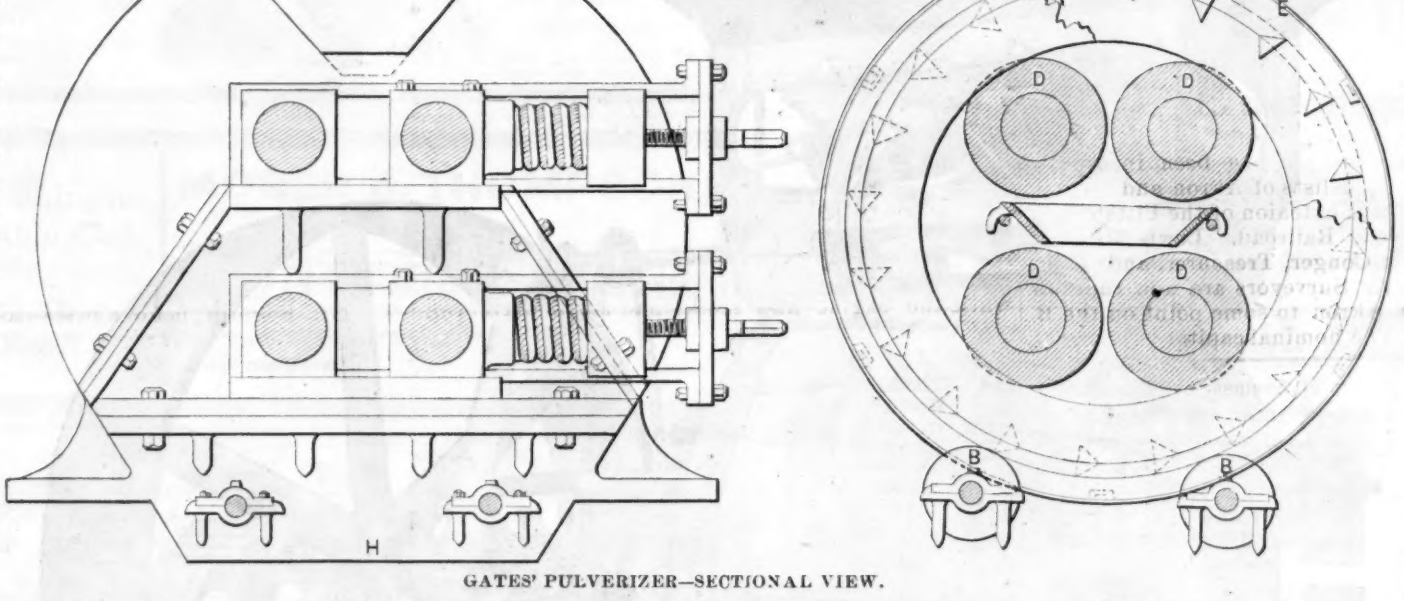

GATES' PULVERIZER—SECTIONAL VIEW.

desired size. Within certain limits, the distance between the individual rolls of a set may be regulated by placing flat pieces of steel between the journal-boxes. The tension on the springs forcing the rolls toward one another, may be regulated by the screws shown in the elevation. The wearing surfaces of the rolls themselves are shells of chilled Franklinite iron, which are held in place by bolts. The material dropping through the lower set of rolls falls upon a revolving screw having elevator buckets on the inside, within an inch of its surface. That portion of the material which does not pass through the screen accumulates with the finer material until the buckets are able to scoop it up and return it to the top set of rolls. The screen is driven by chain from the main shaft and runs on the friction rollers B B. The entire crushing mechanism is inclosed in a casing, the journals, however, being placed out of the reach of dust.

The machine is destined to supply a long-felt want for the pulverization of any hard and refractory substances, and a careful examination of the machinery in its construction and workings shows it to be well and substantially built.

For further information please address the manufacturers, Messrs. Charles Kaestner & Co., 303 to 311 South Canal street, Chicago, who will put in their pulverizer to responsible parties, and guarantee with 15 horse-power to pulverize 40 tons per day through 40 mesh screen, and that with less than one-tenth the expense for repairs that are engendered by use of stamps.

Messrs. Kaestner & Co. are now building a machine for Col. John H. Davy, of Galena, D. T.; one for S. L. Bailey and Robert Seamans, of New York, for use in Wyoming, and six for Frank Eaton, of Rapid City, D. T., for use in the mammoth mines near Rapid City.

ONE of the fruits of protection to our iron interests is shown in the following statement, from a Johnstown paper, of Oct. 26: To-day and tomorrow the Cambria Iron Company will pay to its employes $100,000 as wages for the month of September. The August pay amounted to $115,000. Prior to that for six months the amount disbursed was below $100,000. Last Friday and Saturday the employes of the Gautier Steel Department received $33,000.

COMMUNICATIONS from practical men are always welcome.

Contracts and Construction.

A CO-OPERATIVE iron mill has been started at Alleghany, Pa.

THERE are prospects of a $40,000 iron bridge over the Schuykill at Reading, Pa.

THE Starr Iron Works, Camden, N. J., are to be re-established, with $400,000 capital.

A $30,000 company has been organized at Mt. Vernon, O., to bore for natural gas.

THE Youngstown (O), Electric Light Co. have been organized, with $60,000 capital.

THE Hamilton Iron Fence Co., Springfield, O., $40,000 capital, have just staked out works.

SHARON Pa., will probably secure the establishment of a large boot and shoe factory there.

MESSRS. A. B. Miller, J. M. Beck, E. G. Kubler and T. F. Cleveland have organized the Akron (O.) Match Co., whose works will have a capacity of 500 gross of matches per day.

RECENT Ohio incorporations, with capital stock: Toledo Handle and Rubber Co., $50,000; Superior Drill Co., Springfield $250,000; Little Giant Plow Co., Mansfield, $20,000; Ohio Force Pump Co., Canton, $25,000; Ashtabula Hide and Leather Co., $25,000.

RECENT fires: G. H. Godden, Basil, O., carriage factory; J. A. Riemmer, Ridgeway, O., saw mill; O. W. Avery, Edmore, Mich., saw and shingle mill; Beadle & Kelly, Troy, O., agricultural implement factory; Levi Simonds, Sugar Ridge, O., saw mill; Andrew Drew, Mt. Cory, O., handle factory.

MR. E. PATRIC, of Rochester, N. Y., inventor of a new variable speed grain drill, has organized a new company in this city, with ample capital, which company has purchased the factory, machinery and raw material of the Thomas, Ludlow & Rodgers Co.—[Springfield (O.) Republic.

THE Ohio Railway Co. has been incorporated by leading capitalists of Akron and Canton to build the western extenion of the Pittsburgh, Cleveland & Toledo Railroad. Lewis Miller is President; A. L. Conger, Treasurer, and R. P. Flood, Secretary. Surveyors are now running lines west from Akron to some point on the B. & O. Railroad. The nominal capital is $250,000.

Power of Engines.

A correspondent asks, in an exchange:

"Is there more power in two cylinders two inches bore, three and a half inches stroke each, both working on same shaft, than a cylinder four inches bore, four and a half inches stroke? And what is the difference in steam space and power? A party claims more power in the two cylinders on account of double or seven inch stroke."

The answer given was: "Working at the same speed and under the same pressure, the four inch cylinder by four and a half inches stroke is more than double the power of two cylinder two inches diameter by three and a half inches stroke."

This is the more misleading, because partly correct. A cylinder two inches bore by three and a half inches stroke, compared with one of four inches bore, four and a half inches stroke, at the same piston speed, is just one fourth the power, simply by reason of its smaller cylinder area. But at the same rotation speed, the engine with the longer stroke will have a further proportional advantage of nine to seven. So that comparing one 2x3½ with one 4x4½, on the same shaft, and consquently having the same rotation speed, we find the proportional power 9x4—7=5 1-7. If one engine 4x4½ has 5 1-7 times the power of one 2x3½, it will have 2 4-7 times the power of two 2x3½'s But horse power is properly reckoned from piston speed rather than rotation speed, because long stroke engines are generally understood to have less rotation speed than those of shorter crank having even equal piston area.—[Journal of Railway Appliances.

The highest chimney in Glasgow is 468 feet. We were told in that city that it was also the highest in the world. It is a part of some Chemical Works and the city authorities required it to be built high enough to take off the gases, so that they would not affect the atmosphere.—[Springfield (O.) Republic.

MAKING ANILINE IN AMERICA.

More About a Great Industry in Which Cleveland is Interested.

The Boston Commercial Bulletin contains the following of interest in connection with the proposed establishment of works in this city for recovering chemicals from the refuse of petroleum for the manufacture of aniline dyes:

Every effort should be made to encourage the manufacture of aniline dyes in the United States and thus save the millions of dollars which are being sent to Europe for these goods. The United States consumes yearly 4,500,000 tons of gas coal and produces 180,000 tons of coal-tar. The whole world produces yearly about 600,000 tons of coal-tar, and 285,000 tons are, according to the best estimates, used for the production of raw materials for the color works. England distils yearly 475,000 tons of tar; France, 50,000 tons; Germany, 37,500 tons; United States a very small amount.

One of the largest establishments for making aniline colors, situated in Baden, a short time since declared a dividend of 30 per cent. on one year's business, and this, too, after placing a considerable sum in the sinking fund, as is their annual custom, this money being used in establishing branches whenever advantageous opportunities offer. The above mentioned dividend is by no means extraordinary, as for the past five years they have been equally large, and their actual profit in two years on alizarine alone was over $2,000,000.

Experiments with Railway Brakes.

The American Brake Co. have sent us data of an interesting test of the railway brakes manufactured by them, made on the White River branch of the St. Louis & San Francisco railroad, below Springfield, Mo., October 29. The train on which the brakes were tested, in the first instance, had a total length of 429 feet, a weight of 164 tons and was made up of empty cars, twelve of which were equipped with the company's improved automatic brakes. The remaining car—a caboose—was unequipped; while the engine and tender had steam driver and tender brakes. The number of stops made in the first test was eleven, on a grade with seven variations, ranging from thirteen to seventy-nine and two-tenths feet, down, to the mile. The following table gives the general result:

	Speed.	Time in seconds	Feet.	Grade.
Average of all stops	23¼	31	652	44
Average of ordinary forward stops	23½	38	727	46

In the second test the train consisted of twelve empty coal cars equipped with automatic brakes, three loaded coal cars unequipped, two loaded box cars unequipped, a caboose unequipped, and engine and tender. The loaded cars were interposed among the empty ones, and the length and weight of the train were 585 feet and 281¼ tons respectively. Three stops were made on a down grade of forty-three, fifty-two and eight-tenths and thirty-seven feet to the mile. The following were the average results:

	Speed.	Time in seconds.	Feet.	Grade.
Average	22	32	413	44

Strains on Iron and Steel.

The various tests which have been made with a view to determine, if possible, the effect of percussion on iron and steel, show some interesting results. In some recent experiments of this kind in England, square pieces of iron and steel boiler plates were used for the purpose, the former being seven-sixteenths of an inch thick, and the latter three-eighths, a charge of one and one-half pounds of gun-cotton being used in each experiment. The plates were laid over, respectively, a basin like cavity in the top of a large block of iron, and the gun cotton was exploded over the centre, at a height of about nine inches. The outcome of these experiments proved that the mild steel plates of the Siemens and Bessemer processes, tempered in oil, possess an endurance and ductility far beyond what have been known to characterize British wrought irons, and that steel possesses certain positive advantages over iron, in the manufacture of boilers, locomotive tire or rails. —[Boston Com. Bulletin.

Books, Newspapers, Etc.

WE are well pleased with the editorial vigor and general good taste of Philadelphia's new trade paper, the Journal of Progress, Woodworker and Machinist.

LABOR AND CAPITAL: By M. C. Read, Hudson, O., 12pp. Delivered before Columbiana County Institute, Salem. Extract from Ohio State Agricultural Report, 1883. Into a brief pamphlet of 19 pages Mr. Read has compressed a great deal of solid sense upon this perplexing question. With his general conclusions we most heartily agree. His views should have a wide circulation.

IN richness of contents, beauty of illustration and excellence of make-up, the current number of Building (Wm. T. Comstock, publisher, 6 Astor Place, New York) is a decided credit to American journalism. It contains 19 selections from six different foreign architectural, decorative, and furniture journals, giving a great variety of designs, including public and private buildings, interior decorations and finish, sideboards, mantels, &c., with letter-press descriptions.

THE November Wide Awake might fitly be called a boys number, since almost every one of its stories, outside the serials, has a boy for the "leading character." Opening with Lungren's beautiful frontispiece, "Autumn Leaves," there follows a stirring narrative poem, of the late American war, by Mrs. Emma Huntington Nason, entitled "The Bravest Boy in Town." The opening story, "Benny's Wigwam," is by Mrs. Mary Catherine Lee, a touching little record of the homelessness of the Indian in the land the race once owned and never sold. To enumerate the other articles of merit would be simply to reproduce the table of contents. The Wide-Awake is *sui generis*, and a very excellent kind it is.

Making Steel Direct From Iron Ore in California.

Yesterday afternoon, in the presence of our leading citizens, among whom were Messrs. C. P Gerichten, E. Parker, A. Wentscher, R. R. Morrison, Dr. Stockton, Dr. Romondino and others. Dr. Bouldin made a practical test of producing by his process steel direct from iron ore. As we stated a few days ago, a furnace had been built expressly for the purpose in McCann's blacksmith shop, and there the test was made. Ore collected from different parties, and the percentage of iron in which was not known, was broken into fine pieces by Mr. Bouldin, mixed with the fluxes or reagents and then placed in the furnace, having probably a heat of 3,000 degrees. To this heat the mixture was subjected for two hours and twenty minutes, which was longer than was absolutely necessary, from the fact that the ore was actually fused in about one and a quarter hours, but was retained in the new furnace the balance of the time to make sure of a complete fusion.

The molten metal was then run into a mold in the presence of our citizens, who, impatiently and full of expectancy, waited for it to cool. It had hardly cooled sufficiently to admit of handling when it was weighed and found to have yielded 62½ per cent. of beautiful high-class steel of a very fine and close grain.

Some of the steel was then subjected to various severe tests, such as were suggested by practical and competent workers of the metal. Mr. Bouldin informed us that the tensile strength of this steel is 15,000 pounds greater than that of steel made by the old and ordinary process. The blacksmiths who were present stated in our presence that the metal was very much like Norway iron, being very ductile, tough and hard. From the same steel tools were made, among which was a cold chisel, with which they easily cut the anvil and samples of other steel from the shop, and this without blunting the edge of the chisel. Mr. Wentscher made another test of the steel by cutting with it glass very successfully.

It must be borne in mind that this ore was obtained in small lots from different persons for the purpose of Mr. Bouldin's demonstration, and the per cent. of steel obtained was very much less than might have been obtained from the various ores that can easily be had in inexhaustible quantities in close proximity to San Diego.—[From the San Diego Sun.

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To Machinists, Manufacturers and Others.

THE publishers of the TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinists and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contribution will be properly revised before sending to press.

☞ When writing to any of our advertisers, please say that you saw their advertisement in the Cleveland TRADE REVIEW.

OUR ORE BUSINESS OF 1883.

With this week the shipments of iron ore from Lake Superior ports will virtually close for the season. A study of the returns made to the Cleveland Board of Trade shows that the total receipts from May 15, 1883—the date of opening of navigation—to November 15, 1883 (six months), were 663,554 tons. The receipts during the suspension of navigation were, of course, inconsiderable. As compared with the receipts for the season of 1882 (993,048 tons), this shows a falling off of 329,494 tons for 1883. Allowing for all desultory receipts by rail, the total receipts this season have fallen off not far from 325,000 tons, or nearly 33 per cent. The shipments from January 1, 1883, to November 15, 1883, 11½ months, aggrgated 644,331 tons, as against 678,735 tons in the twelve months of 1882. The shipments have been quite steady, ranging from 43,350 tons in February (the lowest) to 77,614 tons in October (the highest).

BARB WIRE INFELICITIES.

Just about the time the barb wire agitation begins to settle down into comparative quiet the irrepressible Washburn & Moen Co. come complacently to the surface in their little injunction act, and immediately confusion, turmoil and uncertainty sweep over the country. The latest objects of monopolistic wrath are the National Wire Co. and T. L. Ellenwood to compel them to pay the royalty called for by their license, issued April 18, 1882, which royalty the parties named have, it appears, "forgotten" to pay. The answer set up by defendants has not yet been made public, but it is to be presumed that they will base their action upon the alleged fact that the Washburn & Moen Co. have since granted licenses on more favorable terms, thus absolving all licensees from paying royalty. In addition, they will have in their support the decision of the courts that the royalty of 75 cents per hundred-weight is an unjust demand. Doubtless, also, they are encouraged in their resistance by the action of representatives of 26 firms throughout the country engaged in barb wire manufacture, who, at Chicago last week, voted to refuse further to pay the 75 cent rate and to tender 30 cents instead. What this will result in no one knows at the present writing. Meanwhile the announcement is made that all the extensive manufacturers of barb wire at Joliet, Ill., have decided to return to Missouri and other Western points within the jurisdiction of Judge Treat, whose decision on their side will be remembered.

The barbed wire industry in this country has, within the past nine years, assumed gigantic proportions. In 1874, 10,000 pounds were made and sold; in 1875, 600,000; in 1876, 2,840,000; in 1877, 12,863,000; in 1878, 26,655,000; in 1879, 50,337,000; in 1880, 80,500,000; in 1881, 120,000,000; in 1882, 160,000,000 (estimated). In Cleveland last year 10,000,000 pounds of barb wire, equivalent to 7,500 miles of fencing, were made. Sales amounted to nearly $1,000,000, and employment was given to 150 men.

EXTENSIVE STEEL WORKS TO CLOSE DOWN.

Unable to run at a loss, the Cleveland Rolling Mill Co. have decided on the 1st of December to shut down, for an indefinite period, their steel works, this necessitating the closing of their rail mills and the banking up of their blast furnaces. The wire rod mills will continue to run. The portion of the works to be closed down consists of four blast furnaces, with a capacity of 400 tons per day; the open hearth plant of five furnaces, with a capacity of 1,000 tons per week; the Bessemer plant of two converters, with an annual capacity of 150,000 tons of ingots, and four steel rail mills with a capacity of 800 tons per day. A large number of men will thus be thrown out.

When such extensive works as these close down, the entirely unsatisfactory condition of the steel rail market admits of no further doubt. In the East, the announcement that the Lackawanna steel rail mill had placed 30,000 tons of Bessemer rails at $35 per ton has caused wide-spread discussion. The motives which caused this cut were business-like and reasonable—by continuing to maintain the $37 rate they were pursuing a suicidal policy; by accepting $35 they are enabled to keep their mill running during the Winter in readiness for the expected advance in prices in the Spring. Strenuous efforts to combine upon the $37 rate were made, but without success, and the policy of "carrying the war into Africa" was adopted as a last resort. That it may prove a war of extermination to the smaller mills is both affirmed and denied. Mr. Thomas Carnegie, of the Bessemer and Homestead steel rail mills, Pittsburgh, is reported as saying that if steel rail manufacturers continue reducing prices he will have to close his works and throw 5,000 men out of employment. Others are giving out that rather than go below the $37 rate they will close down their mills.

It is not strange that manufacturers should talk thus when it is considered that the price of steel rails has steadily declined from $60 on the 1st of December, 1881, to the present figure, a drop of $25 per ton in 23 months. Whether "rock bottom" has been reached is still an open question. Iron rails, which then cost about the same as steel rails cost now, sold in 1877, we believe, at $32.50. Certain it is that only the very large mills can stand up under such low prices, unless (a bad thing, indeed, to come to) the price of labor is seriously curtailed. We note, as an indication of the tendency of things, that already the skilled employes of the St. Louis Ore and Steel Co., whose wages have been based upon $47 per ton for steel rails, have voluntarily offered to accept a rate more in accordance with present prices.

LOW WATER AND BOILER EXPLOSIONS.

The position assumed by Mr. A. C. Getchell, Chief Inspector of the Cleveland District for the Hartford Steam Boiler Inspection and Insurance Co., in a valuable paper read before the Civil Engineers' Club of Cleveland last Tuesday evening, awakened much interest among the members at the time, and bids fair to become the subject of general discussion throughout the country. Mr. Getchell holds, with much force and apparent good reason, that, whatever other causes may give rise to boiler explosions, low water and superheated steam cannot constitute such factors. Repeated experiments have failed, he claims, to explode boilers through this agency; in fact, the writer of the paper himself first disabused his mind of this idea some years ago, when a locomotive driven by him was on the point of exploding (according to the low water theory), on account of the stoppage of the supply of water from the tank. The crown of the boiler had already begun to lose its shape under the great heat to which it was subjected, when the cool-headed engineer bethought himself that the pipe from the tank to the boiler might be clogged. Investigating, he found this to be the fact, removed the obstruction, and then, expecting every instant to witness a terrible explosion but more anxious still to make a siding and get out of the way of a close following express train, let the cold water directly in upon the hot plates, exploded his theory, instead of his locomotive, and ran upon the siding just in time to see the fast train with its precious freight whizz by.

Mr. Getchell not only has a theory, but has the nerve practically to support it. Mr. Joseph Williams, of Sharpsburg, Pa., having a few days since written to the Pittsburgh *Dispatch* offering to give a boiler to any man that will agree to stand close to it and let him (Mr. Williams) heat it up, and turn water into it when overheated, Mr. Getchell has, we understand, forwarded to this challenge an acceptance, conditional only upon Mr. Williams' agreeing to set the boiler up. This looks as if there might be "some fun" among boiler men before the Winter is over.

MAKING DENSE METAL CASTINGS.

The recent discussion, by an intelligent contributor to this journal, of the changes which occur in steel during the process of hardening will render interesting some reference to an invention just brought out in England by Mr. Carl Maria Pielsticker, Engineer. It relates to an improved process for eliminating the occluded gases in steel and in other metal castings, which, if not separated, render the castings, on cooling, more or less porous. Briefly stated, the process consists in effecting this separation by subjecting the molten metal to the action of centrifugal force under exclusion of air. The centrifuge used consists of a wrought iron shell, cylinder-shaped and rotary, closed at the bottom and open at the top, in size 18″x3′. This is given a water jacket and is enclosed by brickwork. In working, the inside of the apparatus is first brought to an elevated temperature by means of a hot blast. The exhauster is set at

work at the same time to draw off the products of combustion. The blast is then stopped, and the centrifuge is made to rotate with considerable velocity. The molten steel is then introduced into the shell, entering which it is at once driven with great force by centrifugal action towards the sides of the shell and deposits itself in a thin sheet against them, gradually overflowing upon a broad rim at the top, thence being drawn off. It is claimed for this process that by its use the occluded gases are entirely eliminated and castings of great density produced.

THE "Future Great Iron City of the South," according to a Southern paper, is to be situated on a high limestone plateau at the foot of Mussel Shoals, where the Tennessee River curves to the northwest. It is backed by a rich iron and coal country and will have fine shipping facilities to all leading markets. It has not yet been named.

THE energetic press of the Lake Superior region appear to be a unit upon the question of demanding that owners-in-fee of mining properties come down from their excessive royalties. Now let the next thing be—a graceful comedown on the part of these much favored parties.

THOUSANDS of tons of heavier grades of sheet iron, it is charged, have, since the new tariff went into effect, been smuggled into this country mixed with taggers iron. The duty on the latter is 30 per cent. *ad valorem*; on the former, 1½ to 2½ cents per pound.

THE Chief of the Bureau of Steam Engineering of the Navy Department, in his annual report, calls attention to the superiority of mild steel to iron in boiler construction. It is about time the Government was finding this out.

THE NAIL INDUSTRY.

Number and Capacity of Mills in the United States.

The Bulletin of the American Iron and Steel Association in its current issue gives a complete list of the nail mills of the United States, of which the following is a summary:

States.	Number of Completed Works	Number of Nail Machines Nov. 1st.	Capacity of Machines in Kegs.	Nail Machines to be added.
Maine	1	30	30,000	...
Massachusetts	10	616	875,000	20
New York	2	55	55,000	....
New Jersey	3	337	630,000	...
Pennsylvania	27	1,425	3,264,000	71*
Virginia	2	105	315,000	†
West Virginia	6	689	1,668 000	83
Alabama	1	60	160,000	40
Kentucky	1	94	275,000	...
Tennessee	2	112	265,000	....
Ohio	9	859	2,200,000	20
Indiana	3	208	529 000	†
Illinois	4	295	723,000	54
Wisconsin	..	....	.....	100
Nebraska	1	20	60,000	....
Colorado	1	27	120,000	....
California	1	70	150,000	....
Total	74	5,008	11,376,000	391

* Not including Cambria Iron Co.
† No. to be added not yet determined.

It will be seen that the annual capacity of the 74 completed nail mills of the country, all running steadily throughout the whole year, is 11,376,000 kegs of cut nails and spikes, an increase of about 25 per cent. over the capacity of the country in August of last year. This capacity will be increased about 1,000,000 kegs when the new works that are now being built are completed, and the existing works have finished the additions they are at present making in the number of their nail machines. Ohio, it will be observed, stands second in the list of States as to capacity.

RETURNS received at the general office of the Amalgamated Association of Iron and Steel Workers, at Pittsburgh, show that in the many iron and steel establishments in the country, with their 100,000 employes, there are at present only two small strikes in progress—one at Birmingham, Alabama, and the other at South Chicago. The Chicago strike has since ended.

CLEVELAND'S INDUSTRIAL POSITION.

HER GREAT IMPORTANCE AS AN IRON CENTER.

What the Board of Trade's Annual Report Shows.

Cleveland's commanding position as an iron center is admirably shown in the annual report of the Board of Trade just issued, for a copy of which we are indebted to the courtesy of Theodore Simmons, Esq., the efficient Secretary. Many of the interesting facts which appear in the report has been drawn from the files of the TRADE REVIEW, for which credit is generally given, though strict justice would seem to demand that such credit be somewhat more explicit in the future. From the voluminous statistics set forth, we select and compile a few facts bearing more especially upon the iron industry.

There were in this city last January, when the police census was taken, 217 large manufactories and 742 small ones; 5 blast furnaces; 15 rolling mills; 44 foundries; 12 boiler works; 57 machine shops and 6 ship yards..

The Lake Superior iron mines in which Cleveland capital is mainly interested made the following yields in 1882: Jackson, 96,830 tons; Lake Superior, 296,509, Cleveland, 206,120; Lake Angeline, 14,326; Republic, 235,109; West Republic, 26,000; Champion, 159,009; Commonwealth, 115,915. Railroads having docks at Cleveland, Ashtabula and Erie had the following capital invested in the ore receiving and carrying business:

New York, P. & Ohio Railroad	$1,212,000
Cleveland & Pittsburgh Railroad	2,048,000
Ashtabula, Youngstown & Pittsburgh	1,241,602
Erie & Pittsburgh	651,237
Total,	$5,152,836

The following are among the manufacturing companies incorporated in Cleveland during the year, with capital stock: Amor Vapor Stove Co., $50,000; Sayles & Anderson Manufacturing Co., manufacturers of iron and brass, $30,000; Cummer Engine Co., $150,000; Newburgh Furnace Co., blast furnace, $50,000; Cleveland Wheelbarrow and Truck Co., $3,000; Allpree Engine Co., $100,000; Hutchinson Smoke Consuming Co., $250,000; Cowing Steel Co., manufacturers of cast steel, $500,000; Walker Manufacturing Co., forgings, couplings, etc., $125,000; Steel Bow Socket Co., $15,000; Rigby Car Wheel Co., $500,000; Cleveland File Co., $10,000; Leader Sewing Machine Co., $250,000; Clark Light Manufacturing Co., manufacturers of light hardware, $20,000; Hare Electric Co., manufacturers of dynamo electric machines, $1,000,000; Cleveland Manufacturing Co., manufacturers of machinery and tools, $40,000; Bink Drill Co., $10.000; Flammang Injector Co., boiler injectors, $40,000; Turn Buckle Co., railroad supplies, $250,000; American Rivet Co., $50,000; American Wire Co., $200,000; Van Wie Manufacturing Co., patent valves, $20 000; Burlington Construction Co, railroads and bridges, $100,000.

The following table shows the total imports and exports of articles pertaining to the iron trade, at Cleveland from July 1, 1882, to July 1, 1883:

	Receipts.	Shipments.
Bolts, nuts, rivets, washers, etc	4,166	15,335
Iron bars, hoops, sheet, etc., (net tons)	614,627	59,125
" bloo ns, billets, e tc	33,511	5,017
" ingots	1,631	8,540
" muck bar	3,145	818
" scrap	47,192	13,485
" speigel	7,633	65
" splices, links, etc.,	2,199	11,776
" ore	839,610	665,188
" pig	96,644	22,128
" car axles	250	4,714
Nails, kegs,	122,303	154,043
Rails, iron, net tons	11,620	22,554
" steel, " "	4,514	30,759
Wire, tons	5,310	17,210
Coal, anthracite, net tons	98,279	70,523
" bituminous, " "	1,332,579	396,603
Coke, net tons,	103,454	1,629

The wholesale hardware houses of Cleveland do a business annually of at least $6,000,000.

New Castle Iron Works Embarassed.

At the instance of W. H. McCurdy & Co., Cleveland, attachments aggregating less than $15,000 were served Thursday on Reis Bros., proprietors of the sheet iron mill at New Castle, Pa. Other suits are liable to follow, by Cleveland parties. The liabilities of Reis Bros. are stated at $50,000, and their troubles are said to have arisen from malicious reports by a representative of a commercial agency.

Communications.

The Cleveland Breakwater and That Nor'wester.

TO THE EDITOR:

Experience is often a valuable but expensive teacher, if we but heed its teachings. Again I have been "pondering," this time on my position on that sore thumb, the East Pier extension, and am going to take all back that I said against it. It has lately been demonstrated that one in ten of our skilled navigators staggered by a wide open mouth of a thousand feet in width with twenty-five feet water and landed on the beach east of the piers. Now if that sore thumb had been built out to a hundred feet beyond the breakwater it is as clear as the waters of our river at the Spring floods that these vessels would not have landed on the beach. True they might have had a "mill" with the sore thumb and have demonstrated which should have the first knock-down, and the insurance company of that jolly tar the "Father of the Breakwater" might not have come off as well as they did with the beach. But by all means let us have the Sore Thumb before the ice and the filth of next Spring's freshets get beached.

Were it not that our experienced navigators were so afraid of a west pier I would suggest that the easterly end of the breakwater be curved outward a hundred feet or so to divert the "under-tow" in nor'westers so that the two towlines of the navigators might hold to bring them into port. A word to the wise, &c.

Mr. Editor, another breeze is just now freshening and blowing quite hard. This time it is in the hands of an experienced navigator who seldom fails to bring his craft into port. Mr. S. S. Stone is navigating the ship channel opening. Mr. Stone is fruitful in schemes; some call him a schemer. Be that as it may, all must acknowledge that his schemes are comprehensive and almost always result in marked good to the city. It is known to many of your readers that I have always opposed that scheme. Here, too, I must haul in my horns, for I have signed Mr. Stone's petition. Mr. Stone does the Civil Engineers' Club the honor of acknowledging its influence by first securing one of its *Strong* members if not as an agitator as an adjutor; next to secure its gray locks he gets all the navigators to sign his paper, knowing their influence over your humble servant, and then comes to me.

Now I almost swear by Mr. S. S. Stone and a sailor on land is full of knock down arguments; besides one gets a sore toe by constantly kicking against the pricks. But I presented to myself a far more potent argument than any of these. I have quite a body of land near the old river bed, and the day the contract is let for this job, I shall mark up this property ten dollars a foot; this means ten thousand dollars in my imagination, if not in my pocket. This was too much for my philosophy, so I chalked down my name without further argument.

But one place was left for signature and that was reserved for the Cuyahoga Furnace Co., and that means the head of the Civil Engineers' Club. That secured, the coast is clear and Cleveland will soon have not only a breakwater but a breakship and a break through to the Harbor of Refuge from the head of the old river bed.

J. H. S.

CLEVELAND, O., Nov. 8, 1883.

THE ONLY REMEDY.

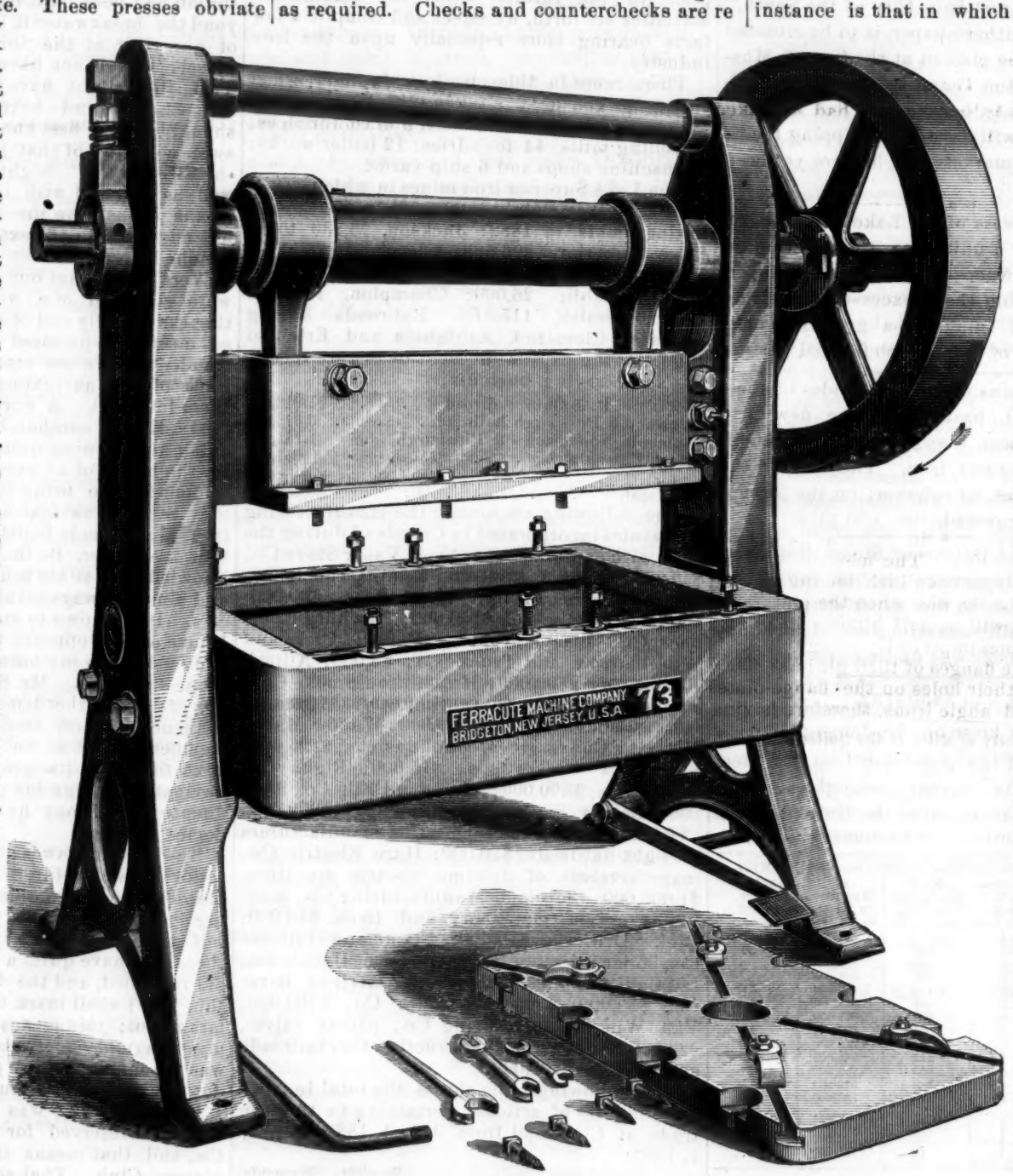
In a talk with a gentleman connected with the government a Herald man learned that the breakwater, though not a failure, is anything but a success as far as being of any value to vesselmen is concerned. He said the work was all right, and that the accidents referred to above were unavoidable, but that the peculiar current of the water rendered it almost impossible for a vessel to enter during such a severe storm as that of Sunday night. He thought the only remedy was to extend the east pier about 1,500 feet.

BY using a good steel drill and wetting with a solution of camphor in oil of turpentine, it is said that holes may be rapidly and easily drilled through the thickest plate glass.

Double Crank Power Press.

The double-crank power press illustrated represents one of a series of six sizes (numbered from 71 to 76), built by the Ferracute Machine Company, of Bridgeton, N. J., and is an exact representation, being engraved from a photograph of press 73. These presses are designed for cutting, or forming the large sheet-metal blanks used in the manufacture of the largest pieced tinware, tea trays &c., which are too large to be cut or formed in an "open front" press. If presses for this work were made with a single crank they would require very long bearings (and consequently the presses would be too high for convenience or utility) in order to obtain the requisite amount of accuracy in the descending stroke. These presses obviate this difficulty by transferring the pressure from crank-shaft to slide-bar at two points instead of one and are built with heavy columns and bed and the two eccentrics are made in one casting, forming a truss which prevents the shaft from springing, the points which transfer the pressure being situated as near the slide bearings as possible. The adjustment of the slide-bar is regulated by means of an eccentric sleeve working in both pitmans, thus insuring an accuracy that cannot be obtained where they are adjusted separately. Special bolster plates, provided with die clamps (shown in the cut) are made to order to suit small dies. These presses have the automatic clutch, spring brake, clamped gibs, safety pins, and most of the improvements peculiar to the other presses manufactured by this company.

The weight of press 73, without bolster plate, is about 4,400 pounds; width between columns, clear, 44 inches; height to slide-bar, when up, 9 inches; stroke of slide-bar, 1½ inches; adjustment of slide-bar, 1 inch; diameter of fly-wheel, 39 inches; width of fly-wheel, 6 inches; weight of fly-wheel, about 750 pounds; extreme height of press, from floor to highest part, 6 feet 3 inches; extreme depth, front to back, 3 feet 3 inches; extreme width, right to left, 5 feet 8 inches. The hole through bed is of rectangular shape, and measures 24x36 inches, the size of hole in press 71, the smallest of the series, being 10x24 inches, and that in press 76, the largest, 36x54 inches.



DOUBLE CRANK POWER PRESS.

COMMENTING on the remark, "Amateurs rarely discover anything worth patenting," a Philadelphia paper says that Fulton and Morse were painters; Corliss was a country storekeeper; Elias Howe a farmer, and Edison has "picked up" all he knows.

A $15,000 factory for the manufacture of cosmoline, vaseline, emulsion of petroleum, etc., is about to be added to Akron's industries.

SPECIMEN copies of the TRADE REVIEW free.

WORKSHOP BLUNDERS.

Some of the Troubles Which Every Machine Shop Experiences.

The mistakes committed in an engineering workshop, says the Mechanical World, of London, are numerous, and are of almost daily occurrence. They may not always be great either in themselves or their consequences, but we are disposed to affirm that each workman will make an average of at least one mistake of more or less import per day. This may appear a strong assertion, but we are inclined to think that work is generally bad in the beginning, and is improved from time to time until it is good as required. Checks and counterchecks are required to counteract the every-day failings of man. There appears to be a gradation of blunders—first, what we may call errors, then mistakes, and finally blunders. Some blunders and their consequent failures are due to ignorance, others to carelessness or to want of skill, others again to cheeseparing economy, and some to haste and hurry in the performance of work. Our intention in the present article is to briefly refer to a few that have occurred and some of which have come under our notice. A few are serious and others amusing, and we think some examples will be of interest. Many of the blunders due to ignorance would be amusing to a well-informed mind if it were not that they are costly; for instance, the case in which a foreman ordered the convexity of a pulley to be turned off and the face to be made hollow, with the view of increasing the grip of the driving-strap. This is equaled by another case where the piston of an engine was dished with a view to increase the power of the engine by increasing the area in contact with the steam. Another instance we call to mind is where for simplicity all the speed cones were abolished on the drills, lathes and planing-machines in the work-shop, and fast and loose pulleys substituted, so that the drill or the lathe could only run one speed for small or large work. Naturally this establishment did not achieve a fortune. We have heard of a fitter who after selecting odd patterns of bevel and mitre gear of equal pitch from the pattern stores was astonished to find that such bastard gear would not work; and we have also heard of a foreman millwright who kept a man with a tin can full of emery and oil to smear anything that had to be a tight fit, such, for instance, as a crank on its shaft—he said it made it seize better. Another instance is that in which a draughtsman who commenced work in a new berth he had obtained, in a curious manner used his right hand to the tee-square, held the point of his set-square to the blade, and took two hands to a pair of compasses. This gentleman's career at the drawing-board was of short duration, lasting only about sixty minutes, at the end of which time he was politely informed that his services were no longer required. One more instance that we remember is due to ignorance of the oxidizing qualities of alloys. The brass-foundry foreman had to make a large brass casting, and, instead of melting his metal in a number of crucibles, elected to melt it in the foundry cupola, thereby oxidizing about 25 per cent. of the metal, which, with brass at one shilling per pound cost a trifle over £20. The value of experience, of course but who paid for it?

No excuse can be found for blunders due to ignorance. If a man does not know his trade, the sooner he learns it the better, or the shop should be quit of him. A foreman or manager who makes these blunders becomes a laughing-stock to his subordinates, and demoralizes the whole workshop. Generally speaking, these make up in cheek and impudence what they are lacking in sound workshop knowledge. Merit is always modest, although unfortunately, it is not given to all to recognize this fact. Next there are blunders due to inadvertence and carelessness. This class of blundering is not quite as culpable as those last mentioned. They are generally due to want of care and observation, such for instance, as in the case of the molder who makes his casting solid, mistaking the core prints for part of the solid casting, never inquiring whether or not cores are required. Cases of this kind should, however, never occur if a proper system of marking patterns is carried out, such, for instance, as coloring the patterns red, and the core prints black. Another case we remember of blundering due to carelessness is when a fitter connected the steam-pipe of a donkey engine to the main exhaust-pipe of the large engine. The reader may imagine his disgust when he found the donkey

would not start. Another blunder is that where a lathe man in boring a pulley kept on boring until the face-plate of his lathe dropped off, he not having noticed that the wheel had been bored through several minutes before. We recollect a blunder due to carelessness and which might have led to serious results. A workman used a boiler as an anvil-block for the purpose of shaping manhole rings to fit its surface, hammering away with all his might while steam was up to 50lb to 60lb. per square inch, never for a moment contemplating the possibility of an explosion if the jarring should start a weak place. One other case is where some boiler-makers mistook the marks which were intended to show where the front-plate was to be riveted to the shell in a double-flued boiler, and proceeded to rivet both ends, not finding out their error until they were about to rivet the gusset-plates on the inside of the boiler, when it was found they would not come in. A close inspection showed that the men had mistaken their marks, the flues being twisted to the extent of the pitch of one hole, a distance of about two inches, with the consequence that the work at both ends had to be cut out and re-riveted. Errors due to cutting plates too short, mistaking the position of punched and drilled holes, are very frequent in boiler and bridge works, and it is only by close supervision and checking on the part of the foreman that errors are kept at a minimum. Blunders arising from want of skill are so common in every trade that they are scarcely looked upon as such, and anyone that has much to do with workmen will know that the ordinary man is always making them. They may try to do their work well, but too many of them have got into a "slip-shod," "jog-trot" style in thier apprentice days, shirking and skulking whenever they have had a chance In country boiler and girder shops we find errors common in calculating the circumference of a boiler. The men will not unfrequently have it half an inch too big. or will pitch the holes badly, and when the plates are bent some holes will be half blind. The same men will sometimes imperfectly straighten their angle-iron for the flanges of their girders. They will then mark their holes on the flange plates from the crooked angle irons, therefore having a crooked line of holes on the flange-plates. A straight line is struck on the plates, and a second marking of the holes takes place to the straight line, it being the intention to straighten the angle-irons from the straight row of holes in the plates, which is a vicious system. The puncher has thus two rows of marks, and it frequently happens that he punches his holes from the wrong marks, so that when the work is put together, half the holes are blind, involving excessive rimmering and drifting. In inspecting girder work the writer has frequently noticed the heads of the rivets burnt, necessitating their being cut out, the time in riveting and the cost of the rivets being thus wasted. Many other examples might be given if space permitted, but enough has been said to show the importance of the apprentice learning his trade well, and the workmen being careful whilst at his work. The utmost care on the part of the foreman and managers is necessary. They should keep a sharp lookout for the detection of errors before they arrive at the stage when they may be called workshop blunders.

Apparatus for Breaking Pig Iron, &c.

The invention of Mr. James Evans, of Gaythorn, in the County of Lancaster, and Samuel Mason, of Leicester, in the County of Leicester, England, is entitled "a new and improved method and apparatus for breaking pig iron, or other similar substances," is as follows: A strong hook made of iron, steel, or other suitable material, as a reciprocating motion given to it by means of a crank, cam or other suitable machinery. This hook is made to draw the pig iron, or any similar material, against two jaws or teeth, made of cast iron, steel, or any other suitable material, until it is broken into pieces as required. By this means the breaking of pig iron or other similar material, is performed with greater facility and with less cost, than has heretofore ordinarily been the case.

UTICA, N. Y., proposes to bring water from West Canada Creek.

LIQUID FUEL.

Alleged Successful Solution of a Scientific Problem of Long Standing.

The idea of a liquid fuel to take the place of the usual substances used for the purpose, namely; wood and coal, is not a new one. Volumes might be written describing unsuccessful experiments in this line. At one time it was thought that coal oil would fill the requirements, and when petroleum was discovered it was thought that the long sought article had been found. But experiments with petroleum showed that it could not be successfully used until it was vaporized. Upon the discovery of this method of vaporizing petroleum a company was formed under a special charter from the state of Virginia called the Vapor Fuel company. This company has for three years been experimenting and perfecting their method until at present they have a practical and thorough system covered by more than 40 patents. The works of the company at South Boston are in complete working order, and various ores are being smelted there. A detailed description of the system will be interesting. The petroleum is brought in ordinary tank cars and is poured into a stationary tank sunk into the earth and covered. From thence it is pumped into the thermogen or generator. The amount of oil which passes into the generator is regulated to a nicety by a valve, and what is not needed goes back to the tank through an overflow pipe. The generator is a brick structure about five feet square. Inside of this structure is a double retort, one inside the other. In the inner retort are two globes which are heated from the interior by super-heated steam. The oil passes in at the top of th s retort and falls on these globes and is vaporized. This super-heated steam passes through the outer retort into the inner retort, and whatever oil there is in there which has not been vaporized by falling on the heated globes is vaporized by direct contact with the super-heated steam. The gas thus formed is conducted off in pipes and can be used wherever a diffusive heat is needed. This union of the vaporized petroleum and super-heated steam makes a gas which produces a hydro-carbon flame which can produce a heat of 5,000 degrees if necessary. In the process the combustion is perfect, and there is very little or no smoke in consequence. The system is one in which every part helps another. For example, the generator runs itself, a boiler to produce the super-heated steam necessary in the system and two furnaces. This furnishes the power for running machinery. One of the most noticeable features of the system is the perfect control in which it is held. If more heat is needed the valve is simply turned a note and more oil and more steam is admitted and more heat is produced. The gas which furnishes the heat can be turned off or on in the same manner as illuminating gas.

The advantages of the system are maifold. In the ordinary metallurgic furnace only about 30 per cent. of the heat is utilized, while in this system fully 90 per cent. of the heat is used, as is shown by the fact that the flue through which the waste products of combustion passes is barely warm, showing that the heat does not pass off. In the vapor fuel process the waste heat is all utilized. In the ordinary metallurgic furnaces the heat is very destructive to the fire brick, while in this system the fire brick lasts much longer and the cost of repairs is very much lower. In the smelting of ores by this system, peculiarly constructed furnaces are used, by which a great saving is made by changing the currents of heat so that the air which enters the furnace is heated on entering. Then, for example, in the working of copper ore, which is usually worked over a number of times, by this system the pure metal is produced by being heated only a few times. By this system the cost of everything is lessened. The enormous capital invested in gas producing plants in the ordinary smelting works, and consequent large number of men employed is entirely done away with. The cost of rebuilding furnaces is lessened to a great degree and as large a number of firemen, coal heavers, etc., is not needed, because the system nearly runs itself. There is no danger of the petroleum exploding, because there is not a quart of oil in the apparatus at any one time.

The world's supply of coal is being rapidly decreased, and in a comparatively few years will be exhausted, unless coal fields be discovered, which is improbable. Something must be done to furnish us with power to run our machinery. Some say that we should get that power from the sun, others that electricity will furnish it; but these powers are not under perfect control yet, and it is possible never will be. Of petroleum the store is almost exhaustless. Europe, North and South America have untold stores within their limits. The system of furnishing a liquid fuel from petroleum and water has been perfected, and is pronounced by all practical and scientific men who have examined the Vapor fuel company's system a complete and triumphant success. The system may be seen in practical working order, and not only in practical working order, but producing the same results as are attained by present systems at a cheaper cost in every particular, and results which cannot be obtained by any other system or process. The Vapor fuel company deserve and will receive the plaudits of mankind, and will reap a rich reward. They invite the most rigid scrutiny of their process by all interested.—[Boston Post, Nov. 2

Gases Passing Through Solids.

It is not generally known that certain metals are readily permeable by certain gases, though it has long been known to scientific investigators. Iron, for example, when red hot, is but a sieve in relation to hydrogen and carbonic oxide. Everybody knows that an ill-constructed stove—that is, a stove that can possibly become red hot at its sides—vitiates the atmosphere; but the cause of this is not so generally understood. It has been attributed to the drying of the air, and vases of water have been placed on such stoves to compensate this by evaporation. It has also been attributed to the burning of particles of dust and fiber floating in the air; but the real source of the actual mischief is the passage of carbonic oxide gas through the red hot iron of the stove walls. This carbonic oxide or imperfectly burned carbon, is quite different from the carbonic acid formed by complete combustion of carbon. The latter is suffocating when sufficiently abundant, but not poisonous, while the former is an irritant poison even in very small quantities.

Mr. J. B. Hannay has recently shown that even glass, when heated to 200° C. (equal to 392° Fah.), absorbs large quantities of oxygen and carbonic acid at high pressures, the gases apparently becoming fixed within the solid; but to what extent they may be given out again or pass fairly through, remains to be further tested.—[Manufacturer and Builder.

The New Standard Time.

TO THE EDITOR:

At a meeting of the General Time Convention held at Chicago, Ill., October 11, 1883, at which a large majority of all the railroad mileage of the United States and the Dominion of Canada was represented, it was agreed that a previous recommendation of the Convention to adopt uniform standards of time should be put in effect with the general Autumn and Winter changes, which are to be made on Sunday, November 18, 1883. The standard adopted for the railroad lines in the terrtory traversed by the "Bee Line System" is that of the Ninetieth Meridian and will be called "central time," which compares with the time now in use, as follows:

Cleveland	time	is 33	minutes	faster.
Columbus	"	28	"	"
Cincinnati	"	22	"	"
Indianapolis	"	16	"	"
St. Louis	"	1	minute	slower;

in other words, from and after date above given, the trains of these companies which have hitherto run by Columbus (Ohio) time, will be run by a standard which is twenty-eight minutes slower. It will be important for your patrons and ours to know this fact at once, and I would feel specially obliged if you would give this circular a prominent place in your local news items.

Yours truly, A. J. SMITH,
G. P. A., C., C., C. & I. R. R.

CLEVELAND, O., Oct. 30, 1883.

Market Review.

OFFICE OF TRADE REVIEW AND WESTERN MACHINIST.
CLEVELAND, FRIDAY EVENING, Nov. 16, 1883.

IRON ORE.

Ore men predict that shipments of ore from Lake Superior will virtually close with this week. The fact that the total receipts at this port in 1883, as shown elsewhere, have fallen off about one-third from last year, tells the story of the policy of restriction wisely adopted by mining companies. It is too early to give any authentic information regarding the amount of unsold ore on the docks. One estimate is 300,000 tons, and with ordinarily good demand it is claimed that the docks will be cleared up before Spring. On the other hand, it is wisely said that the demand must be much better than at present prevails in order to see this done. Sales during the past week have been exclusively for small lots, and trade has been very quiet. We hear of the sale of one small lot of Menominee non-Bessemer ores at $5.50, a half dollar in advance of our last week's quotations. The receipts of the week have been 15,703 tons; shipments 16,318 tons. We quote as follows:

No. 1 Specular and magnetic Bessemer Ores per ton	$6.50@ 7.00
No. 1 Specular (non-Bessemer) ores per ton	5.50@ 6.50
Bessemer Hematites	5.00@ 5.25
Non-Bessemer Hematites	4.75@ 5.00
Menominee Range Bessemer	6.25@ 6 75
Menominee Range non-Bessemer	4.75@ 5.50

Receipts and shipments of iron ore at Cleveland each day the past week were as follows:

Date.	Receipts (tons).		Shipments (tons).	
Nov. 8	2,793	"	4,079	"
" 9	668	"	1,296	"
" 10	8,540	"	3.9.2	"
" 12	2 574	"		"
" 13	12	"	3.051	"
" 14	1,116	"	3,950	"
				"
Total	15,703	"	16,318	"
Last week	24,336	"	18,361	"

FAIRPORT.

[Specially reported for the TRADE REVIEW.

FAIRPORT, O., Nov. 15.—Arrivals by lake have been delayed by bad weather the past week. Receipts of ore for the past week ending last evening have been 872 tons.

LORAIN.

[Specially reported for the TRADE REVIEW.

LORAIN, O., Nov. 15.—Receipts of ore for the week, have been 3,600 tons. Vessels are preparing to lay up.

PIG IRON.

The searcher after news in the pig iron market must look in vain—everything is monotonously quiet, with sales of small lots as the universal custom. The present low prices are generally maintained, though there has been some shading on broken lots a little off grade. The shutting down of mills noticed elsewhere will no doubt still further depress the market, but it is not believed that prices can go lower. We quote:

CHARCOAL PIG IRON.

No. 1 Lake Superior charcoal	$23.00@25.00
No. 2 Lake Superior charcoal	23.00@25.00
Nos. 3 and 4 Lake Superior	24.00@27.00
Nos. 5 and 6 Lake Superior	23 00@25.00
Nos. 1. 2, 3. 4, 5, Salisbury	35.00@37.00
Southern Car Wheel	28 00@33.00

BITUMINOUS AND COKE IRON.

No. 1 foundry, all lake ores	$21.50@22.50
No. 2 same	20.00@21.00
No. 1 foundry, lake ores, with cinder mixture	20.50@21.50
No. 2 same	19.50@20.50
No. 1 foundry, native Ohio ores	21.00@22.00
No. 2 same.	19.00@20.50
No. 1 silvery, native Ohio ores	21.00@22 00
No. 2 same	18.00@20.00
No. 1 gray forge, red short	19.00@20.00
No 1 gray forge, neutral	18.00@19.00
No. 1 Bessemer	22.00@23.00
No. 1 "Arnold" American Scotch	24.00
No. 2 " " "	23.00

Receipts and shipments of pig iron at Cleveland each day the past week have been as follows:

Date.	Receipts, tons.		Shipments, tons.	
Nov. 8	262	"	65	"
" 9	217	"	38	"
" 10	114	"	191	"
" 12	1,084	"	55	"
" 13	443	"	126	"
" 14	76	"	31	"
Total	2,196	"	506	"
Last week	1,494	"	4,161	"

E. L. Harper & Co., Cincinnati, furnish us the following: "We take pleasure in announcing that we have been appointed Sole Sales Agents for the Quinnimont Furnace, W. Va. This iron, as is well known by the many familiar with its merits, is in the forefront of the neutral coke irons, and is popular, not alone for its superior qualities in strength and softness, but because of its uniformity of grading. It is pre-eminently a reliable foundry Iron. We have a limited amount of Numbers 1 and 2 foundry on hand. Soliciting your esteemed inquiries for prices," &c.

MANUFACTURED IRON.

Sales of merchant iron lag, being uniformly in small lots. Prices are maintained, and no indication is given of lowering them. Nevertheless, buyers are holding off with the expectation of better offers in the near future. Among local mills the outlook is far from encouraging. Besides the shutting down of the steel department of the Cleveland Rolling Mill Co., other large concerns are likely to close also. Within a few days the Lake Erie Iron Co. will shut down their nut and bolt works but will still keep their blast furnace in operation for a season. The Union Rolling Mill Co. and the City Forge will run with reduced forces. The Forest City Mill may shut down next Monday. Over-production and lack of confidence are the leading causes, of course. Receipts of bar iron the past week have been 1,192 tons; shipments, 1,438 tons.

STEEL RAILS.—The cut on steel rails in the Eastern market to $35 has been followed by the determination of the Cleveland Rolling Mill Co. to shut down its steel plant, the company wisely concluding that it is better to shut down than to run at a loss. Shipments of steel rails last week were 265 tons; receipts, 1,399 tons.

James M. Swank says there are too many large steel mills in the country and the present decline in the price of rails is due to overproduction. He says that the iron trade generally is suffering in the same way and for the same reason; "but," he added, "the country is really prosperous, and I see no signs of bad times ahead. We are getting down to hard pan prices, and I think we have reached bottom at last. I do not think that steel will go any lower than it is at the present quotations. Although my opinion is only that of one man, I think that there will very shortly be a decided reaction."

WROUGHT PIPE.—Prices are somewhat more firm at present discount. In fittings the market is somewhat unsettled. We hear of some sales at 33 per cent. discount, and it is rumored that offers have been made at even better discounts than this. The regular discount is 25 to 30 per cent. Stocks are fa r, some mills, however, being a little short.

HARDWARE.

Dealers are fairly supplied with stocks, and trade the past week has consequently been quiet. The severe weather, also, seems to affect trade somewhat unfavorably. Taking the volume of trade as a whole, it is about the same as last year; some jobbers report it, however, about 10 per cent. lighter. Collections are very poor.

NAILS—There is a good demand, which mills are able to meet promptly. Prices are steady at the $2.70 rate. At the meeting of the Western Nail Association, at Pittsburgh Wednesday, a general suspension of production was ordered for a period of five weeks, beginning December 22 and ending February 4. The meeting was the largest for many months, and the discussion developed no improvement in the condition of the trade. Stocks are low and ill-assorted, and the demand is only fair. No change was made in the card rate. Advices from the Eastern Association are to the effect that it will probably order a restriction also. Receipts at Cleveland the past week have been 2,364 kegs; shipments, 9,418 kegs.

Western chain manufacturers met at Cincinnati the past week, adopted a uniform quality and gauge, and decided not to make any advance over ruling prices.

SCRAP IRON.

Receipts of scrap iron the past week have been 654 tons; shipments, 213 tons. Market quiet.

MACHINERY OILS.

The demand is fair for the best grades of animal oils having a good cold test, but very moderate for weaker oils. We note a decline of 2c. on cotton seed oil, both white and yellow, an advance of 2c. on West Virginia lubricating 28-deg.

COAL.

The coal trade is steady, with no perceptible change. Vessel freights are higher, and lake shipments are heavy. Anthracite receipts are active.

Receipts and shipments of coal at Cleveland each day the past week were as follows:

Date.	Receipts tons). Anthracite.	Bituminous	Shipments (tons). Anthracite.	Bituminous.
Nov. 8	628	5,653	139	1,389
" 9	372	5,238	853	166
" 10	198	7,111	38	3,855
" 12	473	6,447	18	358
" 13	700	7,257	177	4,111
" 14	498	5,156	337	53
Total	2,869	34,862	1,562	9,932
Last week	6,212	33,985	551	19,309

Receipts of coke at Cleveland the past week have been 5,914 tons.

AT CHICAGO.

[Specially reported for the TRADE REVIEW.

CHICAGO, Nov. 13.—The total rail receipts of bituminous coal at Chicago from May 1 to November 1, 1883, have been 1,149,827 tons; anthracite, 231,804; by lake, bituminous, 174,543; anthracite 641,865. Total bituminous 1,324,370; anthracite 873,669. The total receipts of all kinds of coal, including coke, from May 1, 1883, to Nov. 1, 1883, were 2,198,039 tons; for the corresponding period, 1882, 2,204,510; decrease, 1883, 6,471 tons. Stocks of anthracite on hand Nov. 1, 1883, were 962,418 tons; at the same time last year, 983,671 tons; decrease, 1883, 21,253.

LORAIN.

Specially reported for the TRADE REVIEW.

LORAIN, O., Nov. 15.—Shipments of coal the past week have been 6,800 tons.

CINCINNATI PIG IRON MARKET.

[Reported for the TRADE REVIEW by Rogers, Brown & Co.]

There are signs that the conditions underlying the market are changing, though surface indications continue about the same. Most furnaces tributary to this market ship as fast as they make, mainly on large running contracts, and where in special cases, stocks had accumulated, the past month's shipments have cut them down to small limits. Unless it can be shown that buyers are heavily stocked, the situation is really more healthy than at any time for six months. And few people conversant with the situation, will claim that buyers are heavily stocked. The movement of metal in all directions, the past week, has been heavy and new sales numerous. Buyers as a rule, however, take no interest in purchases beyond their present wants. Some lots of hypothecated iron coming from the lately embarrassed Hanging Rock furnaces, and which have demoralized the market in charcoal pig recently, have been sold the past week. We quote for cash:

Hot Blast Foundry.—Hanging Rock Charcoal, No. 1, $22 50@$23 50; Hanging Rock Charcoal, No. 2, $20 00@$22 00; Southern Charcoal, No. 1, $21 50@$22 00; Strong Coke, No. 1, $19 50@$20 00; Strong Coke, No. 2, $18 50@$19 00; Strong Coke, No. 3, $17 50@$18 00; Soft Stone Coal, No. 1, $19 50@$20 50; Soft Stone Coal, No. 2, $18 00@$19 00. Forge—Strong Neutral No. 1 mill $18 50@$17 00; Cold Short No 1 mill, $15 50@$16 50. Car Wheel & Malleable—Hanging Rock Cold Blast, $30 00@$31 00; Hanging Rock Warm Blast, $23 00@$26 00; Southern Car Wheel Iron, $25 50@$26 50; Lake Superior Car Wheel Iron, $24 50@$25 50; Lake Superior Malleable Iron, $24 50@$25 50.

[Reported for the TRADE REVIEW by E. L. Harper & Co.]

The conditions of the market at our last report are unchanged, there being no new element or feature, beyond a stronger likelihood that consumption is in excess of production. The volume of business is quite satisfactory, though prices continue weak. We quote as the figures representing the transactions of the week.

FOUNDRY.—Hanging Rock Charcoal, No 1, $22 50@$23 75; Hanging Rock Charcoal, No. 2, $21 50@$22 75; Strong Neutral Coke, No. 1, $19 00@$20 00; Strong Neutral Coke, No. 2, $18 00@$19 00; American Scotch, No 1, $18 00@$19 00. GREY FORGE.—Neutral Coke, $16 75@$17 00; Cold Short, $16 25@$16 75. CAR WHEEL AND MALLEABLE—Hanging Rock, Strictly Cold Blast, $27 75@$28 25; Hanging Rock Warm Blast, $24 00@$24 50; Lake Superior, Charcoal all grades $25 25@26 00; Southern Car Wheel Strictly Cold Blast, $26 50@$27 50.

LUMBER MARKET.

PLANK—MIXED WIDTHS, 1¼ AND 1½ INCH.

A 1 & 2..$50 00 A 3..$40 00 B. $32 00 C..$21 00 D..$14 00 E..12 00

2-IN. 12, 14 AND 16 ft., TOGETHER.

A 1 & 2..$48 00 A 3..$40 00 B..$32 00 C..$21 00 D..$14 00 E..13 00

BOARDS—1 IN. MIXED WIDTHS.

A 1 & 2..$45 00 A 3..$36 00 B..$29 00 C..$20 00 D..$14 00 E..11 00

STOCK BOARDS—12 IN.

A 1 & 2..$45 00 A 3..$36 00 B..$34 00 C..$20 00 D..$15 00 E. 12 00

STRIPS—6 IN.

A 1 & 2..$42 00 A 3..$ ... B..$32 00 C..$20 00 D..$15 00 E..12 00

FLOORING, SIDING AND CEILING.

Matched flooring..... A 3, $42 00 B, $35 00 C, $23 00 D, 18 00
Matched drop siding, 6 in. A 3, $42 00 B, $38 00 C, $23 00 D, 18 00
½ in. bevel siding.....A 1 & 2, $22 00 A 3, $20 00 B, 18 00
Beaded ceiling $2 higher than flooring.

BILLSTUFF.

Small joist, 12, 14 & 16 ft. $12 00 | Small timb'r, 12,14,16,18 ft 14 00
18 ft .....$12 00@$13 00 | larger than 8x8, special.
Long timber, 20 ft. and over, add about $1 per ft. to the price of short.

SHINGLES, LATH AND MILL WORK.

Shingles, XXX, 18 in.....$4 10 | Lath, Norway $2 50
clears or clear butts $2 50@$3 00 | S, 1 S, $1.00; S, 2 S $1 50
Lath, W. Pine .....$2 70 | Matching, flooring and drop siding.....$2 00@$2 50

Average Value of Fuels.

In a practical treatise on boilers and their use, by Prof. Chas. A. Smith, now in course of publication by the American Engineer, of Chicago, a table is given of "variations in the quality of fuel," or in their evaporative power. Below are some of these average and comparative values of best samples of fuel:

Pure carbon	15.	Dry Bituminous coal	15.9
Dry charcoal	14.	Coking " "	16.
Good dry coke	14.	Dry pitch pine	10.
Anthracite coal	15.3	Mineral oils, about	22.
Dry peat	10.	Illinois coal	12.

The rank of Bituminous coals in this comparison is worth the attention of all consumers of coal for steam producing.

Prof. Smith also states that the refuse from the best soft coal is from 3 to 10 per cent., from Illinois coal and from Anthracite 10 to 20. The soft coals lead in value.

IT is estimated that the world's stock of locomotives consists of 66,000; of passenger cars, 120,000, and of freight cars, 500,000. The capital invested in railways, which are in all 200,000 miles long, is £4,000,000,000. The commerce of the seas is carried by 12,000 steamers and 100,000 sailing vessels, whose tonnage amounts to over 20,000,000 tons.

ADVERTISE in the TRADE REVIEW.

Cleveland Wholesale Prices.

[The lowest quotable prices are given in all cases.]

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship.....“ “ 18 75
Heavy railroad..“ “ 19 50

Axes.

per doz.
James' 2d qual.....$7 00
Buckeye.....7 75
“ doub. bitt.....15 00
Hunt's.....9 50
Mami's.....8 00
Lippincott's Crown.....8 50
Cut More.....9 00
Peck's Double Bit.....22 00
“Champion Blade.....11 00
Good triple silver steel..11 50

Axles.

Standard list,....
Nos. 1 to 6, 50 & 10 off
Nos. 7 to 14, 50 & 5 off
Nos. 15 to 18, 45 off
Nos. 19 to 22, 50 & 5 off

Anvils.

per lb.
Eagle, Amer.....10c dis 20
Wright's.....11¾c@11c
Armitage's Mouse Hole.....9¼c@9¾c
Trento.....10¾c
Wilkinson's.....10¼c

Anvil Vise and Drill.

Millers Falls Co. $28. ...dis 20
Cheney Anvil and Vise dis25&2

Augurs and Bits.

C S cut augers .....dis 50&10
do do do bits.....50&10
D C gimlet do Ives..dis 50
Snells bits .....dis 40&10
Russell Jennings' augers, dis 10&10&10
Cook's pat augur.....40&10

Animal Pokes.

Akron.....$ 3 50
Camp's.....4 00
Berea, per doz.....4 00
Eagle, per doz.....5 00

Apple Parers.

Domestic&Reading ℔ doz.$7 00
Turn Table.....4 50

Bolts.

Machine .....dis 70
Plow.....dis 40
Plow, R. B. & W.....dis 40
Cast Iron Barrel Shutter, etc.....dis 55&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts. dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list.....dis 50&10
Tire, R. B. & W., new list.....dis 70&10
Stove,American Screw Co.'s.....dis 40
B. B. & W.....dis 40
Bolt Ends 16c. per lb net...70

Bellows.

Dis
Hill,s.....40 pr cent
Bl'ksmith's com new list,50 ℔ ct
Moulder's new list, dis 25 ℔ ct
Hand, new list, 25 per cent

Butts.

Dis
Wrought brass.....70
Cast, loose joint....60&10
Pin, loose.....55&10
Wrought, fast joint narrow.....50&10
Wrought fast joint broad.....50&10
Wrought loose joint broad.....55&10
Wrought table and back flaps.....50&10
Loose joint, without acorns.....55&10
Ten per ct. extra dis for cash.

Boiler Plates.

“Gaylord”–Standard Quality.
C. No. 1.....4 50
C. H. No. 1 Shell.....4 75
C. H. No. 1, 50,000.....5 25
C. H. No. 1, 55,000.....5 75
C. H. No. 1 Flange.....6 50
Firebox
T. S., 60,000 .....(as per)..6 50
T. S., 65,000 .....(act of)..
Homo. Steel,70,000(of Cong)7 50
Heads, ¼c ℔ lb. extra.
N.B.-Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Boiler Tubes.

“National” Standard Gauge 1 inch to 10 inch.....dis 37½
“National” Standard Gauge 11 inch to 15 inch.....dis 25
“National” Special Locomotive Tubes.....net list

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Boiler Makers' Tools.

Doty's Power Shears ..net list
“ Hand Lever Shears.net list
“ Power Punch.....net list
“ Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch .....net list
Boiler Plate Rolls.....net list
Buffalo Forges& Blowers dis 20
Watson's “ “ net list
Spring Tube Expander ..dis 15
Roller Tube Expander.net list
National Tube Cleaner .dis 20
Wire Flue Brushes .....net list
Anvils—'PeterWright'12½ ℔ lb
Solid Box Vises .....net list

Cleveland Stamped Elbows

Genuine Russia Iron

4½inch, per doz.....5 50
5 do do 7 50
6 do do 9 50
7 do do 11 00

Charcoal Iron

4½inch, per doz.....2 50
5 do do 3 50
6 do do 4 50
7 do do 5 50
Planished Amer. Russia Iron
4½inch per doz.....5 00
5 do do 6 50
6 do do 8 50
7 do do 9 50
Discount 33⅓ per cent

Chisels.

Hot and cold cutting...℔ lb 30
Railroad track 30
Machinists.....30
Mallet head 50
Pape 50
Packing 50
Stone cutters 50

Crowbars.

Cast steel .....℔ lb 7
Iron,steel points.....5c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table net
Am. Miller Bros.' Cutlery Co .....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co.list net
Aaron Berkenshaw's pocket dis 25
Fram Cutlery Co.,. table net
Cleveland Cutlery Co...dis 25
Miller Bros., pocket.... 33⅓
Akron Cutlery Co.....dss 45

Coopers' Tools.

Bradley's ..... dis15@20
Braton's ..... dis15@20

Chains.

Coil by cask.....

3-16	¼	5-16	⅜	7-16	½
10½	9	8	7	6½	6¼

Drills and Drill Stocks.

Blacksmiths', each.$2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W ...dis 20&10

Drawing Knives.

Peck, Stow & Wilcox... dis 70
Witherby's .....dis 65@10
Nobles Mfgr. Co 15
Adjustable handle 20

Emery and Sand Paper.

Regular Numbers .....℔ lb 6c
Flour and F. F .....℔ lb 4c
B. & A. Emery Paper ...dis 35
Sand paper .....dis 35

Enameled & Tinned Ware.

Kettles.....dis 50
Sauce Pans.....dis 30
Tinned Sauce Pans.....dis 30

Files.

Parkin's $5 to £ ..dis 45 ℔ cent
E.M. Boynton's, new list dis 25
J. & Riley Carr .....4.50 to £.
Johnson & Bro. .....dis 50
Butcher's.....4.50 to £.
Walter Spencer & Co.'s “ Diamond ”.... 4.50 to £.
Fisher's.....4.75 to £.
Moss & Gamble.....4.50 to £.
H. Disston & Sons (new list).....dis 40 per cent
Heller Bros.' Horse Rasps dis 35
Nicholson.....dis 40
New American.....dis 40
Union File Co.....dis 40

Grindstones.

Beroa.....1@1⅛ ℔ lb
Ohio.....1¼@1⅞ ℔ lb
Nova Scotia.....1¼@1⅝ ℔ lb
Lake Huron.....1@1⅛ ℔ lb

Hammers.

Maydole's .....dis 15
Cheney's.....dis 25
Hartford Hammer Co....dis 20
Humason & Beckley.....dis 50
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75,dis25&10
Nelson Tool Works..dis 40&10
Warner & Noble's .....dis 5
Kip's.....dis 15

Hatchets.

Buckeye.....Shingling,
Nos..1, 2, 3,
℔ doz $7 50,$8 00,$8 50,dis 40
Claw,
Nos...1, 2, 3,
℔ doz$8 25,$8 75,$9 25, dis 40
Lathing,
Nos.....1, 2, 3,
℔doz $7 50,$8 00,$8 50, dis 40

Hinges.

Champion double acting spring hinges .....dis. 30
Screw &Strap 8@12 in...$5. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10
Clark & Co.....70&10

Locks.

Whipple Mfg Co .....50 &10
Norwalk Lo Co .....45&10&10

Nails.

10 to 60d $2 70
8 and 9d 25
6 and 7d.....50
4 and 5d.....75
3d 1 50
2d 2 75
3d fine 3 00
2d fine 3 75
⅝ inch 3 00
4d barrel 1 00
1¼ inch barrel nails.....1 50
1½ do do do 1 75
1 do do do 2 50
⅞ do do do 3 00
Cut spikes, all sizes.....35
Clinch nails, all sizes.....1 75
Casing and box nails.....75
Finishing nails,.....$1 25
Tobacco nails, ...50

Nuts and Washers

Nuts, square .....8c off list.
Nuts, hexagon.....9c. off list.
Washers.....7c off list.

Nuts, Bolts, etc.

Machine Bolts .....dis 70
Bolt Ends .....dis 70
Boiler Patch Bolts.....net list

Picks.

Railroad, 4 to 5 lbs.. doz $6 60
5 to 6 lbs.. 7 20
to 7 lbs.. 7 80
7 to 8 lbs.. 8 40
Railroad Tamping Pick.. 7 to 8 lbs..doz 10 80
Mill Picks per lb.....75c

Planes.

Ohio Tool Co .....dis 20
Sciota .....dis 25
Bailey's Pat. Adjstbledis 20@10
Sandusky, fancy .....dis 15
Buckeye .....dis 20
Ogontz .....dis 25

Rivets.

Iron .....dis 40
Tinned.....dis 40
Copper .....dis 50

Rules.

Stanley..... .....dis. 70 & 1

Squares.

D..s
Steel or iron, case lots.....50
Try squares and T bevels....40

Spikes—WROUGHT

All lengths by ¼ inch .....4 c
do do do 5–16 .....3½
do do do ⅜, 7-16 & ½in 3

Shovels and Spades.

Ames' new list, July 1, 1881, ...dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Bishop .....dis 50
Chisholm.....dis 25@30
Rowland's .....dis 50
Griffiths .....dis 50

Sad Irons.

From 4 to 10 lbs.. per lb 3 net
Self-Heating .....℔ doz $9 net
“ Tailors..℔ doz $18 net
Gleason's Shield and Toilet .....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott'sIrons, square back.....dis 35
Enterprise Star Irons ...dis 35
Combined Fluter and Sad Iron.....℔ doz $15, dis 15

Saws.

Disston .....dis 20
Disston's Circular .....dis 40
Disston's hand panel, rip, &c .....dis 20
Boynton's lightning cross cut new list .....dis 40
Boynton's circular and mill.....dis 40
Boynton's ice .....dis 25
Boynton's lightning hand panel and rip .....dis 25
Livingston's butcher and kitchen .....dis 20
Livingston's framed wood Nos. 101 102 103 104 105 doz $10 8 50 10 7.50 6 20 net
Peace circular & mill...dis 40
Peace hand panel and rip .....dis 25
Peace band saws, all widths.....dis 10

Scales.

Hatch, Counter, No. 171... ℔ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks' .....dis 20
Buffalo Scale Co.....dis 40
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatlilon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓&10

Screws.

Dis
Flat head iron or steel [new list] per cent dis. 55
Flat head brass 55
Round head iron or steel 50
Round head brass.....45
Brass and Silver capped. 30
Japanned, list of Plain Screws.....40
Coach, patent Gimlet point, list per 100.....65
Lag, taper points.....70
Bed 10
Machine, flat head, iron. 55
round head, iron 50
Bench, iron .....55&10
wood, beech, per doz $3 10
wood, hickory .....20&10

Tinners' Tools & Machines.

Machines(P. S.&W.) ...less 10
Tools (P. S. & W.) ..... “ 20

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe dis 70&10
Malleable Iron Fittings.. 20
Grey Iron Fittings ....dis 50
Steam Brass Goods.....dis 55
Water “ “ .....dis 50
Ludlow Gate Valves ...dis. 20
Register Gauge Cocks net 1 00
Montg'ry Gauge Cocks $1 each
Steam Gauges.....dis. 40
Steam Guages 5 in. net dial per doz 30 00
Scotch Glass Tubes.....dis. 70
Tools.....special.
Duplex Injectors.....net.
Soil Pipe & Fittings, Mott's List.....dis. 30
Sinks, Mott's List.....dis. 25
Copper Bath tubs, sinks, etc.....dis. 25
Galvanized Iron Boilers “Scaifes.”.....dis. 50
Marble Slabs, Counter-sunk net per ft.....$ 1 25

Sheet and Tank Rivets.

“Norway.”

All sizes.....dis. 15

Boiler Rivets—“ Albany.”

⅜,½,11-16,and ¾ in. diam .5 00

Valves.

Dis.
Jenkins'Patent Gate Valves.35.
“ “ Globe ..40
“ Standard Packing “ ..30

Vises.

Solid Box, list of July 1, '79,.....dis 45
Solid “Crown” (A. H. Hilldick)....40 to 100 lb. 15c net
Solid, Peter Wright's 15⅓
Solid, Wilkinson's.....13⅓
Parallel, Parker's.....dis .0
“ Simpson .....dis 20
“ Prentiss.....dis 15
Saw Filers, Hopkins' ℔ doz $17.50, dis 10
“ Wentworth's .. 9 00
Reading.....dis 45&10
Lowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Wrenches.

Coe's genuine.....50
Girard Standard....dis 50 & 10
Mechanics' 10 and 10....dis. 50
P. S. & W. Mechanics dis 50&10
Agricultural.....dis 70

Wire.

Brass and Copper.....dis 30
Bright & annealed, Nos. 0 @ 18 dis 60@62½
“ “ Nos. 19@ 26 dis 65
“ Nos. 27@ 36 dis 70
Coppered Nos.0@18, dis 55@60
Galvanized, Nos. @18,market list, ...dis 45@50
Tinned, Nos. 0@ 18,dis 45@47½
Cast steel .....dis 40
Tinned Broom Wire, Nos. 18@ 25 .....dis 55
Annealed Fence, Nos. 8 and 9 .....dis 60&5
Annealed Grape, Nos. 10 to 14.....dis 60& 5
Galvanized Telegraph, Nos. 7 to 9 .....℔ l
Galvanized Telegraph, Nos 10 to 11 .....℔ lb 8¼c
Galvanized Telegraph, No. 12 .....℔ lb 10½c
Fence staples. ℔ lb 5½@5¾c
Fence Staples, galvanized, ℔ lb 6½@6¾c
Stubs Steel Wire $6 00 to dis 30
Barb Wire, painted 5½c
Barb Wire, galvanized .. 6½c
Crucible Steel Ropes from ⅜ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at 33c

TINNER'S STOCK.

Tin.

Banca,.....per lb. 23⅛
Straits .....“ 22½c
English.....“ 22½c
Bar .....“ 23½c

Tin Plate,

IC 12x12 charcoal.....$ 6 75
IC 14x20 do 6 50
IX 14x20 do 8 25
DC 12½x17 do 7 00
DX 12½x17 do 9 00
DXX, 12½x17 do 11 00
DXXX, 12½x17 do.....13 00
IC, 20x28 do 13 75
IX, 20x28 do 17 25
IC, 14x20, Best Roof.....5 75
IX, 14x20, do 7 50
IC, 20x28 do 12 50
IX, 20x28 do 15 50
IC, 10x14 Best Coke.....5 90
Subject to card discount.

Solder.

Half and Half, in bars....14½
No. 1 do 13½
Spelter Solder.....

Pat Planished Sheet Iron

[A] .....per lb 10½c
[B] ..... “ 9c

Nos	10	15	21	25
to	14	20	24 & 26	
Com	3-10	3-30	3-40	3-75
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra.

Zinc.

Sheet, cask.....6¼c
Sheet, open.....6½c

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Bra

All Nos not thinner than No No 28, wider than 2 in. not wider than 14 inch 30c
All Nos to No. 28 inclusive, and widths over 14 to 20 in. inclusive 35c
All Nos to No 28, inclusive, and widths over 20 to 30 in. inclusive 38
½c per lb advance on each No above Nos 28 to 38, inclusive.
AllBrass thinner than No.8 is Platers' Brass at 53c
Sheets 24x48,and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c per lb. more than High Brass
Gilding metal 8c per lb. more than High Brass.

Platers' or Gold Metal

In Bars 48c
Sawed 51c
Planed or Polished...54c

For Slitting.

Metal in width in. to ¼ in. to No. 28, inclusive, 1c per lb., advance.
Metal, in width 2 in. to 1 in. thinner than No 28,2c per lb. advance
Metal, in width ⅛ in to ¼ in thinner than No 28, 5cper lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance
Any of the above widths cut to particular lengths add 7c per pound.

COPPER.

Lake Ingot.....15¼@16c
Baltimor .....14¾@15c
Arizona .....15@15 c
sheathing Brazier Copper, Bolts, etc.
All sizes, 16 oz. per sq. foot and over. per b 25c
nd over per lb.....25c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq. foot, per lb. 25c
Brazier's Copper, 10 oz and 12 oz. per sq ft. per lb. 27c
Brazier's Copper lighter than 10 oz. per sq ft. per lb 34c
Circles less than 84 inches in diameter . per lb. 33c
Circles 84 inches in diameter and over .....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz per sq. ft... per lb. 24c
Bolt Copper.....per lb. 28c
Copper Bottoms per lb. 28c
No copper is Sheathing except 14x10 inches,and not to exceed 34 oz. to the sq. ft.

Tinning.

14x48 .....per sheet 6c
All other size sheets,2½c per square foot For tinning both sides,double the above amou.

LEAD.

Amerc'n, ℔ lb.....4¾c
Bar, ℔ lb.....5½c
Pipe, ℔ lb 6¾c dis 10 per ct
Sheet. ℔ ft 7¼c dis 10 per ct
Tin-lined pipe 15c dis 10 per ct
Block .....45c.
Chilled Shot.....8c

Babbitt Metal.

Babbit Metal, No. 3. 14 X... 42
Babbit Metal, No. 2. 16 XX.. 46
Babbit Metal,No. 1,18 XXX.. 50
Babbit Metal, C.....20
Babbit Metal, B.....24
Babbit Metal, A.....32
Dis 40 per cent.

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch..... 1 80
4½ to 6 by ⅜ to 1 inch..... 2 00
1¾ to 6 by 1⅛ to 1¼ inch 2 30
1¼ &1¾ by ⅜ to ¾..... 2 00
1 & 1⅛ by ⅜ to ¾..... 2 10
⅝ ¾ and ⅞ by .⅜ to ½.... 2 20

Round

1 to 1¾ inch 1 80
2 to 2¾ 2 10
2¾ to 3¼ 2 40
3¾ to 4 .....2 90
4¼ to 4½ 3 40
4¾ to 5 .....3 60

Square.

1 to 1¾ inch 1 80
2 to 2¾ 2 10
2¾ to 3¼ 2 40
3¾ to 4 .....2 90
4¼ to ⅞ 2 90

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch 2 10
1 to 1¾ by ¼ and 5-16 do 2 20
⅝ to ⅞ by ¼ and 5-16 do 2 40
⅝ to ⅞ by ½ and 5-16 do 2 80

Half Oval and Half Round.

Wagon box iron ¾ and ⅜ 3 50
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ⅛ to 3-16..... 2 70

Hoops.

1¼ to 2 , Nos 16 to 18..... 3 10
1¼ to 4 do 13 to 15..... 3 00
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24..... 3 50
No 25 to 26..... 3 70
No 27..... 3 90
No 28..... 4 30

English Steel.

Best cast.....℔ lb 16c
Extra cast.....16½c
Round machinery..10c
Swaged, cast 18c
Best double shear...15½c
Blister, 1st quality ...13c
Refined tool steel....16½c
Spring calking .....7¼@7½c
German steel, best ..11c
2d quality 10c
3d quality 9c
Sheet cast steel, 1st quality 15½c
2d quality 14½c
3d quality 12½c

American Steel.

Best brands of refined cast steel, ⅜ to 2 inches..12c
Crucible cast.....7c
Open-hearth ditto ... 4½c
Hammer cast steel ... 9c
Spring cast steel.....5½c
Bessemer and open-hearth spring.....½c
Ditto plow.....½c
Steel boiler plate .... 6½@7c
Bessemer machinery.5 @6c
Spring and calking ...7¼@7c
Tire 4
Sleigh shoe.....4

Bessemer Steel Tire.

⅝ to 1 by 3-32 .....4 ℔ lb
⅝ to 1 by ⅛ to 5-32 .... 4 ℔ lb
⅝ to 1 by 3-16 to ⅜ .... 4 ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit.....10
Axle steel for wagons.....7
Frog points and plates.....8
Frog size bars 8
Pick, hammered 10½
Mattock, beveled 9
Table cutlery 7½
Trap spring steel.....10
Pike and cant hook.....8½
Coal and granite.....9

SCRAP IRON AND OLD METAL.

DEALER'S BUYING PRICES

	Per Ton
No. 1 R R wro't scrap ...	$20
No. 1 wrought scrap.....	19
No. 1 Machine cast scrap.	14
Stove plate (free from burnt iron)	11 00
Grate bars	7
Pipes and flues (clean)	15
Tank iron.....	14
Hoop and band iron.....	10
Light sheet iron.....	9
Axle turnings.....15 00@16 00
Wro't turning (f from cast)	13
Wro't iron, oily drillings	9@10
Cast borings	9 00
Malleable iron.....	9
Uncut wro't iron boilers	19
Old copper per lb.....	15
No. 1 H. Brass per lb.....	11
Heavy yellow Brass do..	9@11
Light Brass per lb.....	7@9
Scrap Zinc per lb.....	2@3
Tea Lead per lb	3
Heavy Lead per lb	4

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe.

Inside Diameter Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	24
¼	08	$0 11	.54	42
⅜	09	12	6.	56
½	11	15	.84	.85
¾	13⅜	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7 55
3½	1 25	1 70	4 00	9 05
4	1 50	2 05	4.50	10 73
4½	1 75	2 40	5.00	12 49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75	...	7.62	23.00
8	4 75	...	8.62	28.00
9	6 50	...	9 68	34 46
10	8 00	...	10 75	40 64
12	12 00	...		54.65

Discount, car load lots, 70 and 10 per cent Less than car load 70 to 70&5.

COAL,

WHOLESALE.

Wholesale f.o.b. cars at Cleveland:

Carbon Hill and Monday Creek.....$2 50
Massillon .....2 70@3 00
Palmyra, lump.....3 25
Brier Hill.....3 25@3 50
Pittsburgh 3 00
Salineville 2 25
Tuscarawas 2 40
New Hazelton 2 50
New Hazelton, mix 1 20
“ “ nut 2 00
Connotton.....2 25
Connotton, mix 1 20
“ nut 2 00
Anthracite grate.....5 40
Anthracite egg 5 58
Anthracite stove 5 85
Anthracite chestnut.....5 98

RETAIL.—Delivered.

Massillon Lump.....$4 00
“ Nut 3 75
Carbon Hill and Monday Creek, lump 3 50
Carbon Hill and Monday Creek, nut 3 25
Straitsville, lump.....3 75
Straitsville, nut.....3 50
Palmyra, lump.....4 25
New Hazelton 3 50
Connotton.....3 00
75c less on cars by car load.
AnthraciteStove andChestnut 6 75
Egg and grate 6 50

OILS.

Pure Oils. p'kages included

Sperm,winter bleached per gal.....1 28@1 33
Whale,winter bleached per gal.....66@68
Straits .....50@53
Bank .....48@50
Lard oil extra W S..66@69
do No 1 do.....55@58
do No 2 do.....50@53
Tallow oil.....62@65
Neatsfoot oil pure..95@$1 00
do No 1.....80@85
Linseed oil, raw ..57@60
do do boiled ..60@63
Cotton seed oil white 51@54
do do yellow 50@53
West Virginia lubricating 28 deg. .....18c@22
Paraffine oil winter pressed.....22@25
Capitol Cylinder.....85
Model do 65
Eldorado Engine 50
Turpentine, per gal..43

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15.....8 00
11x14 to 15x24.....9 00
16x24 to 20x28.....10 25
15x34 to 24x30.....11 25
26x28 to 24x36.....12 00
26x36 to 26x44.....13 50
26x46 to 30x50.....14 58

DOUBLE THICKNESS Dis 60 & 25

6x8 to 10x15.....2 25
11x14 to 15x24.....13 75
16x24 to 20x28.....16 25
15x34 to 24x30.....17 75
20x28 to 24x36.....19 00
26x36 to 26x44.....20 75

Dis. 70

Getting Homes for Workingmen.

There are two important steps to be taken by every young man who has to depend upon his own exertions for a living. The first is to master some occupation which he can rely upon in after years for a livelihood. The three or four years spent in learning a trade are to most young men years of privation, during which they are compelled to exercise the most rigid economy. The lessons taught during these years, if properly applied, will render the next step—the procurement of a home—comparatively easy of accomplishment. A wage-worker, in the possession of a good trade and a comfortable house to live in, is on the highway to competence.

The greatest obstacle to the steady advancement and prosperity of the mechanic is the constant drain which the landlord makes upon his income. It is plain, therefore, that the first step towards independence is for the mechanic to own his own house. If he has to pay out in rents every ten years as much money as would secure for himself a comfortable home, there is but a slim chance for his ever accumulating much money. Once a wage-worker becomes his own landlord he can save a sum annually at least equal to what his rent would be, and this continued for a period of years must result in a competence if judicious use is made of the money. It may not be possible for all mechanics to obtain homes of their own, but thousands of them who continue renters all their lives could do so if they would only make the effort. It requires some degree of self-denial to accomplish the result, but once attained it removes the chief obstacle to those steady accumulations which are the foundations of all fortunes, great or small. —[Pittsburgh Commercial Gazette.

High Piston Speeds.

The difficulties experienced by many persons with high speed engines lies in the engines themselves, in some cases, and not from any fault in the system of high speed. The practicability of this is well established, but it depends for success upon construction and design. Obviously, if we require 20 horse-power from an engine, whose piston will develop only ten horse-power, under usual conditions, we must have the dimensions of a twenty-horse engine in the bearings and working parts. We must also have thorough lubrication, and a system whereby it is rendered possible, and positive, at all times and under all conditions. It must be so certain that the attendant will have no more anxiety or labor, with his high speed engine, then with one at ordinary speed, for in any other event the engine is a failure. In this one aspect, more high speed engines have been unsatisfactory than any other, for it has been considered a matter that would take care of itself. Given, a bearing and an oil hole and a man to pour oil in, and the lubrication is provided for—in the minds of some. So it is, so long as the engineer gets around in time, and does not forget anything, but the question is not so settled. It depends greatly upon pressure per square inch on journals and wearing surfaces, and this is only another way of saying that dimensions settle the question in the main—as they do. Of course we are not to be taken as saying that a high speed engine is to be lubricated through an open oil hole, in any event, but this plan is one which is very frequently necessary.

A trouble experienced with high speed engines is in the tight fits of the main bearings. These are frequently ground truly cylindrical, and they hug the main bearings as a kid glove fits the hand. With such absolute contact, the oil has no chance for distribution, and is prevented from forming a film over the surface. True, it enters at the top, and is supposed to be distributed over the bearings, but if these are so tight in the boxes that they touch in every part, there is great liability to heat.

Nothing is better settled than the fact, that at certain pressures per square inch on bearings, they will run cool and without trouble, while any excess causes it.

High speed is as feasible, practically, in a steam engine as in any other machine, the only conditions necessary being ample bearing surface to secure moderate pressures per square inch; perfect balance, so that no unusual or unequal work is thrown on the bearings; moderate compression, so that the bearings shall have a moment of rest when approaching the center, and thorough and economical lubrication; good workmanship is, of course, assumed. With these conditions there is no reason why a stationary engine should not run regularly at 1,000 feet per minute, piston travel, which is what we mean by high speed.—| Mechanical Engineer.

Steel vs. Iron.

The London Ironmonger, an authority on matters pertaining to iron and steel, says that so far as all indications serve to show iron is being gradually elbowed out of the market by steel, but the displacement is in many particulars proceeding very gradually. Steel has a great deal to recommend it in the way of cheapness and the facility with which some kinds of it are produced, but it is not yet perfect by any means. Recent practice in steel-making has distinctly shown that some kinds of pneumatic and open-hearth steel are to be implicitly relied upon. That such is not invariably the case, is a well-known fact, and it is just that uncertainty which prevents the almost universal use of steel and protects the puddler. The time will come no doubt, when steel may be bought for any specified purpose with the utmost confidence that it will do the work required of it, when it will triumphantly pass through tests under which it now frequently fails, and when it will roll and weld as well as iron. These desirable ends have not yet been universally attained, and so long as they are matters of the future so long will the puddler pursue his arduous and unhealthy vocation.

Funny Way of Testing Castings.

A foreign contemporary, whose name is purposely omitted, says:

"The practice of putting test pieces on very large casting is followed by not a few engineering firms. Usually these pieces are broken off with a sledge, and the only test obtained is that of the number of blows required for the purpose, and appearance of the fracture. If these pieces, instead of being, as they usually are, oblong in section, were made rectangular and sufficiently long to put a proper spanner on, a better result might be obtained. By putting a spring balance on to the handle of the wrench or spanner, twisting them off, and noting the pressure required for the work, a very definite idea could be obtained in regard to the character of the metal in every casting, and a step made toward more accurate testing of metals generally."

A test piece cast upon a large shape is not a correct exponent of the strength of the mass. The larger the body and the slower it cools, the coarser its crystals, and the weaker its structure or cohesion. A test piece an inch square, cast on a shape two feet square, or more, might be twenty-five per cent. stronger than the mass.—[Mechanical Engineer.

ACCORDING to Engineering, the substance known as anthracene has been found by Dr. Tommasi to possess a new property—namely, sensitiveness to light—which will doubtless prove of value. Anthracene on exposure to light acquires different physical and chemical properties without any change in its composition. If a cold, clear saturated solution of anthracene in benzol is exposed to the direct rays of the sun, it becomes turbid, and deposits crystals which have received the name of paranthracene.

THE Bessemer steel mill of the Pennsylvania Steel Co. produced last month 17,255 tons of steel ingots.

Iron Clad Paint Co.,

Factory 75 & 77 Central Way. Sec. & Treas., No. 3 Case Building

Cleveland, Ohio.

Trade Mark Patented—Paint Patented

Order direct from the **Iron Clad Paint Co.,**

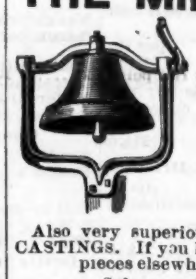
And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof, and CHEAPEST PAINT MADE.

Furnished both Dry and Ground in Oil.

Used by nearly all the Railroads. 63

THE MILLER CO.



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Manufacturers of the Ohio Farm, Church, School and Factory

BELLS.

Also very superior strong, soft and clean CASTINGS. If you have failed to get difficult pieces elsewhere give us a trial.

Sole manufacturers of the 44

Torrent and Unique Steam Pumps.

BRICK and TILE MACHINES

For Catalogue and prices, address

J. W. PENFIELD,
Willoughby, Ohio.

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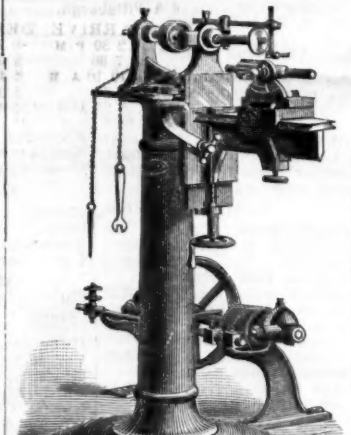


E. E. Garvin & Co.'s Improved Cutter Grinder

149-153 Center street, (Cornell's Building) NEW YORK.
Send for illustrated Catalogue.

The Curtis Expansion Trap,

Curtis Regulator Co., Manufactured by the

153 Beverly Street, Boston, Mass.
Sold by all large dealers everywhere.

GENERAL AGENCIES—
109 Liberty Street, New York.
86 and 88 Market Street, Chicago.
925 Market Street, Philadelphia.
59 Holliday Street, Baltimore. 44

Smith & Curtiss,

JOBBERS OF

TEAS,

COFFEES AND SPICES

ALSO PROPRIETORS OF THE

CLEVELAND

Coffee and Spice Mills

107 & 109 Bank Street,

Cleveland, O.

Cleveland Flue Cleaner Mfg. Co

Manufacturers of Aitchison & Doolittle's

PATENT STEAM

Flue Cleaner

49 Power Block, Cleveland, Ohio.

The most simple, durable and economical. It saves from 15 to 25 per cent on labor and fuel.

Send for circulars and price list of Cleaner and Hose. Good, reliable, energetic agents wanted. eow

TRAVELER'S REGISTER.

Lake Shore & Michigan Southern.

TRAINS GOING EAST.	Arrive. From West.	Depart. From East.
Fast N. Y. Express	*1 35 a m	*1 50 a m
N.Y.,Bo't'n & At. Ex.	*7 05 a m	*7 30 a m
Elyria Accommodation	†8 35 a m	.....
Pt.Clinton Accomd'at'n	†11 00 a m	.....
Buffalo Accommodation	†11 00 a m	†11 15 a m
N. Y and B't'n Fast Ex.	*2 25 p m	*2 55 p m
Conneaut Accom'dation	.....	†4 50 p m
Night Express	†10 10 p m	†10 35 p m
TRAINS GOING WEST.	**Arrive. From East.**	**Depart. From west.**
Fast Limited Express	*12 23 a m	*12 33 a m
Mich. Ex. via Sandusky	*2 50 a m	*8 05 a m
Chi. Ex. via Sandusky	‡6 35 a m	7 00 a m
Mich. Ac. via Norwalk	.....	†6 40 a m
Conneaut Accom'dat'n	†8 40 a m	.....
Toledo Ex. via Norwalk	†1 25 p m	†8 30 p m
St. Louis Ex.via San'ky	*1 40 p m	*2 05 p m
Chi. Pac.Ex. via Nor'lk.	*7 05 p m	*7 35 p m
Pt.Clinton Accom'dat'n	.....	†5 00 p m

Sunday trains for Nottingham—Depart 0:00 a. m. and 2:15 p. m., return at 10:05 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. L. & W. and Galion Exp	9 30
No. 12 St. Louis & New York Exp.	*3 20 P.M
No 6 Indianapolis & Columbus Exp	10 00
No 4 Columbus & Cincinnati Exp.	*3 50
No. 10 Wheeling Express	*7 15
No. 14 Cincin New York fast line,	1 40 A.M

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	*8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex	7 10
No. 3 Special St. Louis & Cin. Ex.	**2 15 P.M
No. 5 Night Express,	*7 10
No. 7 C. L. & W. and Galion Exp	5 00
No. 17 Spec. Col. Cin'ti. Exp.	1 50

**This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Lorain & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express	7 15 P.M
Uhrichsville Express	9 30 A.M

DEPARTURES.

Wheeling & Cleveland Express	7 10 A.M
Uhrichsville Express	5 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 1 New York Expaess	*6 40 a.m.
No. 7 Mahoning Valley Ac	11 55 a.m.
No. 5 Fast N. Y. & Pitts. Ex	*1 40 p.m.
No. 3 N. Y. & Pittsburgh Ex	*7 05 p.m.
No. 9 Youngstown & Pitts. Ac	10 15 p.m.

DEPARTURES.

No. 12 N. Y. & Pitts. Express	*7 20 a.m.
No. 6 Youngstown & Pitts Ac	11 05 a.m.
No. 4 Fast N. Y. & Pitts. Express	*2 50 p.m.
No. 2 Mahoning Accommodation	4 35 p.m.
No. 8 N. Y. and Pitts. Express	11 05 p.m.

* Sunday trains.

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Alliance Accommodation	10 10 A.M	3 45
Ravenna Accommodation	8 37	5 30
Night Express	6 25 A.M	†11 40 P.M
Newberg Accom'dation	12 10 P.M	11 00 A.M
Newberg Accom'dation	1 50 P.M	12 30 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

	ARRIVE.	DEPART
Wheeling Junction	10 15 A.M	8 30 A.M
Canton	1 35 P.M	6 15 P.M
Wheeling Junction	6 15 P.M	3 20 P.M

Special trains leave on Sunday at 4.20 P.M., arriving at Cleveland at 7.15 P. M.

Depot foot of South Water Street.

Connotton Valley Railway.

Trains leave Cleveland,	A. M.	P. M.
Canton & Sherrodsville	*7 30	2 30
Canton, Coshocton & Sherrodsville		2 30
Canton & Coshocton	7 30	4 10
Kent accommodation	*10 35	8 00
Trains arrive:	A. M.	P. M.
Canton & Sherrodsville	10 15	
Canton & Coshocton		1 25
Canton, Coshocton & Sherrodsville		*7 30
Kent accommodation	*8 05	7 50

Newburgh depart at 8:05 a. m., 11:20 a. m., 6:15 p. m.; Newburgh and Bedford depart at 11:00 p. m.

Newburgh arrive at 8:55 a. m., 4:45 p. m., 7:00 p. m.; Newburgh and Bedford arrive at 6:45 a. m.

Trains run daily except Sundays. *Trains daily. Depot corner Huron and Ontario streets.

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Rail road to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	2 30 P.M	8 25 A.M
Express	7 30	2 00 P. M
Accommodation	10 10 A.M	3 45 P. M

"The Nickel Plate."

Going East.	ARRIVE.	DEPART
Buffalo Accom.	10 50 a.m.	10 55 a.m.
Conneaut Accom		4 20 p.m.
Chicago Accom	9 30 p.m.	
Local Freight	12 04 p.m.	12 45 p.m.
Going West.	ARRIVE.	DEPART.
Chicago Accom		7 15 a.m.
Conneaut Accom	9 25 a.m.	
Bellevue Accom	5 20 p.m.	5 25 p.m.
Local Freight	1 12 p.m.	1 50 p.m.

Rocky River Accommodation departs 6 20 a.m.; 1 15 p.m.

Euclid Accommodation departs 7 30 a.m.; 12 10 p.m., 5 45 p.m,

All trains daily except Sunday.

GEORGE S. PAINE,

Practical Plumber

AND GAS FITTER.

Plumbing materials of all descriptions kept constantly on hand.

362 Superior street, CLEVELAND, O.

Telephone No. 866. 14

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

Formerly Atlantic & Great Western Railroad]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh Washington, Baltimore and the Southeast.

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7 20A.M. LIGHTNINGEXPRESS(daily) sleepingand hotel coaches from Leavittsburg. 9:05 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p. m.; Buffalo, 6:15 p. m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p. m. supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

2:50P.M. LIMITED EXPRESS, Pull-Sleeper Cleveland to New York, (daily). Arrives at Meadville, 6:55 p m.; Jamestown, 9;13 p. m.; Salamanca, 10:10 p. m.; Now York, 10:25 a. m.

11:25 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsurg to New York without change. Arrives at Youngstown, 1:45 a.m.; Pittsburgh, 6:15 a. m.; Washington 9:15 a. m. Baltimore 10:34 p. m.; Meadville, 3:50 a. m. Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a. m.; Rochester, 1:10 p. m.; Hornellsville 1:20 a. m.; Corning, 12:53 p. m.; Elmira 1:21 p. m.; Binghampton, 2:50 p.m.; New York 9:25 p.m.

2:50 P.M. PITTSBURGH EXPRESS, daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:19 a.m.

4:35 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p. m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:20 A.M. PITTSBURGH EXPRESS, —(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p. m. and 4:20 p.m.

11:05 A.M. YOUNGSTOWN& PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:40 a.m., 7:05 p. m., 10:55 a. m 1:40 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK,
Gen. Pass'r. Agt., Cleveland, Ohio.
M. L. FOUTS,
J. M. FERRIS, Pass. Agt., 131 Bank st.,
Gen. Man'gr, Cleveland. Cleveland.

THE NICKEL PLATE.

New York, Chicago & St. Louis Railroad.

The passenger equipment of this new trunk line is all new and is supplied with the latest appliances necessary to safe, speedy and comfortable travel.

At Chicago, Passenger Trains arrive at and leave Union Depot, Van Buren street.

Following is the time in effect Nov. 4, 1883, and until further notice:

GOING EAST.

	Local Pass'n'gr	Local Pass'ngr.	Conneaut. Accom.
Lv. Chicago	8 15 am	.....	.....
Ar. Valparaiso	10 05	.....	.....
" Ft. Wayne	1 30 pm	.....	.....
" New Haven	2 05	.....	.....
" West Leipsic	4 15	.....	.....
" Arcadia	5 12	.....	.....
" Fostoria	5 25	.....	.....
" Gr. Springs	6 12	.....	.....
" Bellevue	6 40	.....	.....
Lv Bellevue	6 50	8 20 am	.....
Ar Cleveland	9 30 pm	10 50	.....
Lv Cleveland	.....	10 55	4 20 pm
Ar Painesville	.....	12 01 pm	5 33
" Ashtabula	.....	1 08	6 31
" Conneaut	.....	1 40	7 00
" Erie	.....	2 37	.....
" Dunkirk	.....	4 15	.....
" Buffalo	.....	5 50	.....

GOING WEST.

	Local Passn'gr.	Local Pass'ngr.	Con'eaut Accom.
Lv Buffalo	10 15 am	.....	.....
Ar Dunkirk	11 53	.....	.....
" Erie	1 51 pm	.....	Leave.
" Conneaut	2 50	.....	6 45 am
" Ashtabula	3 18	.....	7 14
" Painesville	4 12	.....	8 11
" Cleveland	5 20	.....	9 25
Lv Cleveland	5 25	7 15 am	.....
Ar Bellevue	8 05	9 40	.....
Lv Bellevue	.....	9 45	.....
Ar Gr. Springs	.....	10 07	.....
" Fostoria	.....	10 46	.....
" Arcadia	.....	11 00	.....
" West Leipsic	.....	11 55	.....
" New Haven	.....	2 05 pm	.....
" Ft Wayne	.....	2 20	.....
" Valparaiso	.....	6 23	.....
" Chicago	.....	8 20	.....

Trains run by Columbus time, which is twenty minutes faster than Chicago, five minutes slower than Cleveland, and sixteen minutes slower than Buffalo time.

For information, call on nearest Agent of the Company or address

B. F. HORNER,
Gen'l Passenger Agent.
LEWIS WILLIAMS,
General Manager, Cleveland O.

Office of the Commissioner

Of Railroads and Telegraphs.

COLUMBUS, O., June 27th, 1883.

E. T. AFFLECK, ESQ.,

Gen'l Pass. Ag't., C. A. & C. R. R.,

COLUMBUS, O.

DEAR SIR:—In reply to your note concerning the condition of your railway, I am glad to state that the State Inspector of Railways, who has been charged with the examination of the Cleveland, Akron & Columbus R. R, has some time since submitted his views upon the road.

With the carefully made report of Engineer Ruhlen before me, I find myself warranted in assuring you or anyone interested in the condition of your road, that within the last two years you have brought the road up to a remarkably fine condition, comparing well in the matter of pleasant traveling and safety with some of the best roads in Ohio. Your bridges are mostly new and remarkably strong Your road-bed has been thoroughly repaired by the laying of steel rail and large supplies of new ties, and by ballast and side ditches. I am happy to say that the road is now in a most excellent and safe condition for the transportation of passengers, and I have no hesitation in commending it to the traveling public.

I am, sir, respectfully yours,

H. SABINE,

Comm'r. of R. R.'s and Tel's.

TIME TABLE.

CLEVELAND & PITTSBURGH

RAILROAD.

On and after Sunday, January 21st, 1883, trains depart from and arrive at Union Station, Cleveland, (city time) as follows:

DEPART.

For the East--8:20 A.M.; 1:55 P.M., 11:35 P.M
For Alliance--3:40 P.M.
For Ravenna--5:25 P.M.
For Newburgh--10:55 A.M; 12:25 P.M.
On Sunday for the East, at 11:35 P.M.

Train leaving for the East (week days) at 1:55 P.M. has sleeping car through to Philadelphia and New York.

Train leaving for the East every night at 11:35 has sleeping car to Pittsburgh.

On Saturday night the train for the East leaving Cleveland at 11:35 runs from Alliance to Pittsburgh via P. F. W. & C. Railway.

ARRIVE--(Week Days.)

From the East--6:20 A.M.; 2:25 P.M.; 7:25 P.M
From Alliance--10:05 A.M.
From Ravenna--8:32 A.M.
From Newburgh--12:05 P.M.; 1:45 P.M.

Time tables, rates of fare, through tickets and further information can be obtained from M. G. Carrel, agent, Union Station, or C. L. Douglass, No. 212 Bank street.

WM. A. BALDWIN, Manager, Pittsburgh, Pa. E. A. FORD, Gen. Pass. Agt.

Bee Line.

Cleveland, Columbus, Cincinnati & Indianapolis Railway.

The Great Central Trunk Route to the Ohio and Mississippi Rivers.

Three Trains Week Days,

TWO TRAINS SUNDAY.

Leave Cleveland with Through Palace Coaches and Elegant Sleeping Cars for

Columbus, Cincinnati, Indianapolis, Terre Haute and St. Louis

Without Change.

This is the only line making Direct Connection with all the principal Trunk Lines of the East for all Southern, Southwestern and Western points, either by way of Cincinnati, Indianapolis or St. Louis for all railway towns in Missouri, Arkansas, Texas, Kansas, Nebraska, Colorado, New Mexico, Old Mexico and the Pacific Coast.

Equipment New and Comprising all Modern Improvements.

The Best Roadbed and Safest Road in the West.

Tickets by this popular route for sale at all regular ticket offices.

E. B. Thomas, General Manager. **O. B. Skinner,** Traffic Manager.

A. J. Smith,
Gen'l Pass. Agent, CLEVELAND, O

THE MONOLITH.

T. NEW'S

Prepared

Roofing.

For Steep or Flat Roofs.

Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free.

T. NEW,

32 John Street, New York.

Beaver Falls Steel Works.

BEAVER FALLS, PA.

Manufacturers of all kinds of STEEL. Special "Beaver" Tool, Die, and Axe Steel, Iron Center, Soft Steel Center, and Cast Plow Steels. Open Hearth Bessemer Agricultural Steel Shapes. Finished Rolling Coulters and Patent Cutlery Steel. 82

F. I. FREEMAN, Prop. JAS. GILLETT, Mangr.

THE

Ætna Machine Works.

Manufacturers of

High and Low Speed

Stationary Engines

BOTH

UPRIGHT AND HORIZONTAL

Geared and Direct Attachment

CIRCULAR SAW MILLS.

STEAM PUMPS,

IRON AND BRASS CASTINGS.

Patent Sets and Head Blocks for Saw Mills, and Machinery of all descriptions. I now have the agency for the celebrated

Watertown Portable Engines & Boilers,

and can supply customers with anything in this line at very low prices.

Call at Works and see them in Stock.

Also manufacturers of

The Ætna Engines.

These are an entirely new style of Upright Engines, designed by F. I. Freeman, and

PATENT APPLIED FOR.

They are so constructed that they can be sold for one-half the price for the ordinary style of the same sizes or power, consequently they are by far the

Cheapest Engines in the Market

And are warranted satisfactory in every respect. They are designed especially for Saw Mills, Grist Mills and Hoisting Machines, and are high or low speed engines, running from one to seven hundred revolutions per minute; are strong and heavily built, of the best material and workmanship.

☞ Parties interested will find one in operation at the works. Call and examine for yourselves. Sizes range from eight to one hundred horse power.

Also dealers in Gas and Pipe Fittings, Globe Valves, and

Second-hand Machinery of all kinds

Prompt Attention given to Repair Work.

☞ Parties wishing to buy or sell second-hand Machinery will do well to call.

Corner Vernon and Hudson Streets,
(Opposite N. Y. P. & O Freight Depot.
WARREN OHIO.

The IRWIN & REBER

PATENT

Expanding Water Conductor

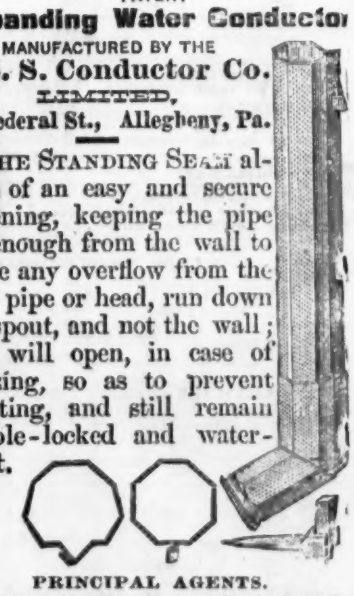
MANUFACTURED BY THE

S. S. S. Conductor Co.

LIMITED,

47 Federal St., Allegheny, Pa.

THE STANDING SEAM allows of an easy and secure fastening, keeping the pipe far enough from the wall to make any overflow from the cave pipe or head, run down the spout, and not the wall; and will open, in case of freezing, so as to prevent bursting, and still remain double-locked and water-tight.



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E. B. Badger & Son, Boston, Mass.; Noyes & Wines, New York; J. S. Thorn, Philadelphia; John G. Hetzell, Baltimore, Md.; R. P. Gormully, Chicago; F. Schmidt & Sons, Milwaukee; Shackelton Bros., Cleveland; Patterson & Hayes, Erie, Pa.; G. H. Peters & Son, Buffalo, N. N.; James Ackroyd, Albany, N. Y.; Witt & Brown, Cincinnati,; Hull & Cozzens Mnfg Co., St. Louis, Mo., and many others.

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W, E, Ana ytical Chemist, 31 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & UPSON MANUFACTURING CO. Manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws. 15

Boiler Makers.

SMITH & TEACHOUT—(Established 1857.) Boiler, Tanks, Stills etc. 644 Broadway.

Bridge and Boiler Builders.

BUCKEYE BRIDGE AND BOILER WORKS, mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave

Coal, Iron and Ore.

ANDREWS, HITCHCOCK & CO., Briar Hill, Coal and Pig Iron. 101 St. Clair St. 81

JACKSON IRON CO. Iron Ore and Pig Iron. Fayette Brown, Gen. Agent. 101 St. Clair street. 15

RHODES & CO. Coal, Iron Ore and Pig Iron. 101 St. Clair street 1

DALLIBA, J. H., Iron Ore. Grand Arcade Building, 101 St Clair st. 51

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts. 41

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection. 41

Dyers.

BICHLMYER, A., 122 Seneca st. Gentlemen's and Ladies' Clothes Cleaned and Dyed. 74

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws. No. 11 South Water street. 51

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins. 74

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st. 61

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way. 33

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway. 64

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow, 48 and 50 River street. 33

Hardwood Lumber.

MARTIN & BARRIS, dealers in all kinds of Hardwood Lumber. 130 Central Way. 51

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manufacturers of Steel and Iron Wire and Steel Tire. 34

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st. 4

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath, shingles, etc. 47 Central Way. 82

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets. 64

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street. 34

Machinery and Boilers.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street. 71

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO. manf'rs of lubricating oils, 23 Euclid ave, 84

Stair Builder.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio. 41

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO, Rubber Stamps, Seals, Stencils. 197 Superior street. 54

Cleveland Business Directory.

Steam Furnaces.

CUYAHOGA ST AM FURNACE CO. build large engines for Stationary and Marine purposes. Blowing Engines for Blast Furnaces and Steel Works. Steam Pumps for Copper Mines, and Steam Helve Hammers for Forges and Bloomeries. Make all kinds of heavy Castings. Foundry and Machine Shop corner Detroit and Center Streets.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample trunks and Cases a Specialty. 56 Public Square 54

Business Directory.

Akron, O

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc. 04

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street. 84

CAHOW BROS. manfrs. of and dealers in Wood and Metal Pumps, Pipe, etc. 225 West Market street. 42

MAY & FIEBEGER, Galvanized Iron Cornices. Send your plans for estimates. 62

Alliance, O.

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing, 41

Buffalo, N. Y.

WHITE, L. & I, J. manf'r's of Coopers' Tools. Carpenters' Tools, and ShipTools. Also manf'r's of Planer Knives and Machine Cutters to order 310-314 Exchange street. 33

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ATLANTIC HOTEL, directly opposite the Railroad Depot. D. Foland, proprietor. W. Foland, H. W. Terrell, Clerks; Wm. Richardson, Night Clerk. 2

Canton, O.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc. 73

BELDEN BURNER CO.—H. S. Belden—B. C. Goodrill. 158 and 160 S. Market-st., Manfrs of gasoline burners and fixtures, and contractors for lighting streets 2

THE SUN VAPOR LIGHT & STOVE CO., manufacturers of Vapor Gas Lights, Gasoline Stoves and Tinner's Soldering Furnaces. Contractors for lighting the streets of cities and towns. No. 116 E. 5th Street 72

Columbus, O.

REYNOLDS BROS., manufact'rs of hand-cut Files and Rasps. Old files re-cut. Send for Price List. 11

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted Borger Bros. & Co. 03

ZELOTES WOOD & CO., manfrs of Malleable Iron. Cor. Randolph and West streets. 13

Cuyahoga Falls, O.

THE CUYAHOGA FORGE AND IRON CO. manfrs. of every description Car. Truck & Driving Axles, Forging, Shafting. 71

Cincinnati, O.

THE CINCINNATI STEAM HEATING CO. mfrs, dealers and contractors. Warming and Ventilation of public and private buildings a specialty. Boilers, Radiation, Pipe, Fittings, Brass Goods, &c. Correspondence solicited. 187 West Pearl street. 92

Erie, Pa.

BALL ENGINE CO., manufacturers of Automatic Engines of 15 to 60 horse power.

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty. 8

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of all kinds. 43

Niles, O.

REEVES Bros., Manufacturers of Boiler, Tank and Sheet Iron work, etc. 64

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc. 72

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice. 2

Business Directory.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42½ Sixth Street. [Up stairs.] 17

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect streets. 51

Rochester, N, Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mall, chisels, &c. 23

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. Graham & Co. 43

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List. 2

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street. 71

TOLEDO FOUNDRY AND MACHINE CO builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry. 03

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Corner Water and Lagrange streets. 84

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss, Springs, &c. made to order. 92 St. Clair St. 3

UNION Manufacturing Co., manufacture Sewing Machines, Wash-boards, Children's Wagons, Carts, Wheelbarrows, Sleds. Kitchen Wooden ware, &c. 3

BOAT BUILDING: Hepburn Bros., prop. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street, foot of Cherry. 3

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulties, Shafting, &c. Cor. 18th & Chapline streets. 42

Youngstown, O.

BEIL, EDWIN & SONS, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock. 1

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath. 1

Improved Joint

FOR GLASS, ETC.,

FOR ROOFING HOT-BEDS

GREENHOUSES, ETC

Applicable to Vertical or Inclined Surfaces, with thick glass, slate or tile,

Making the Roof Impervious to Water, Dust, Cold or Snow.

Call on or Address WM. WARD, 827 Broadway,

Or E. W. Palmer, Cleveland Window Glass Co., 130-134 Champlain Street, Cleveland, O 91

Harris Iron Works

SOLE MANUFACTURERS OF

The Harris and New Harris

Hot Air Furnace.

Fine Castings and Job Work of all kinds to order. Send for prices and catalogues.

143 to 147 Perry street, BUFFALO, N.Y. 19

FINE WOOD PHOTO-ENGRAVING

SEND COPY FOR ESTIMATE. IT WILL PAY YOU) CROSSCUP & WEST, 702 CHESTNUT ST PHILA PA

FOR SALE.

MALLEABLE IRON WORKS

of Akron. Two large Annealing Ovens with equipments for same; Japanning and Tinning Rooms; good Boiler and Engine of 25-horse power; machine and store house two stories, 25x50 feet, containing pulleys, hangings, benches, polishing barrels, etc.; Moulding Foundry 50x70 feet, including cupola, ladles, crane, core-oven and air-furnace with a fine high stack.

Four buildings and one acre of ground well located. Shipping facilities the very best. Buildings and machinery all nearly new. The whole will be sold at a bargain and on reasonable terms of payment. Enquire of

A. B. TINKER, at Buchtel College.

WANTED.

WANTED, a good mechanic in every machine shop and foundry to get up clubs for both the **Weekly** and **Monthly** TRADE REVIEW AND WESTERN MACHINIST. We give the best rates to clubs, and pay better commissions to those who get them up than any other journal published. For particulars or specimen copies address

DAY & CARTER, Publishers, 122 Water Street, Cleveland, O.

WANTED—SITUATION—By a practical machinist of seven years' experience at lathe work. Best of references. Address T. F. L., care Trade Review, 122 Water Street, Cleveland, O. tf

FOR SALE—Dormant scale—with two iron columns and sliding poise; also double beam and graduated pendulum. Capacity, 2,500 lbs. Size of platform, 30x36 inch. Nearly new. Address DAY & CARTER, 122 Water street, Cleveland, O. tf

WANTED—PARTNER in two or three good paying manufacturing businesses. For particulars address F. H. & Co., care Trade Review.

FOR SALE—35-HORSE POWER BOILER, 1 smoke stack, 18x12 engine, 15x12 engine, 1 large emery grinder, 1 lot No 4 brass riddles, 1 boiler feed pump with counter complete, 1 pony pump, shafting, hangers, pulleys and belting. All above goods in first class order and will be sold at a bargain if sold soon.

JOHN S. ORAM, 44 155 River st, Cleveland O.

FOR SALE—One 4 in. Upright Shafting Straightener.

One Speed Lathe, 13 in. swing, iron bed, 6 ft. long, 5½ in. deep. An excellent tool; in perfect order

One Foot Power 10 in. Swing Lathe, 4 ft. bed; 30 in. between centers.

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The above tools for sale cheap.

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HOISTING ENGINES,

SOMETHING NEW IN DESIGN FOR

Double Dock Hoisting Engines

The Engines are mounted on an A frame, bolted to a strong bed-plate, and by the side of the boiler, but not dependent upon the boiler, making the most convenient double engine, taking up less space, and can do more and better work than any other of the same dimensions.

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Building, Pile Driving and other Heavy Work it has no equal for efficiency.

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Manufacturer of the celebrated

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GRINDSTONES

The best in the market

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Manufactured in sizes from 3 feet 6 inches to 8 feet in diameter; in thickness from 6 inches to 25 inches. Orders solicited.

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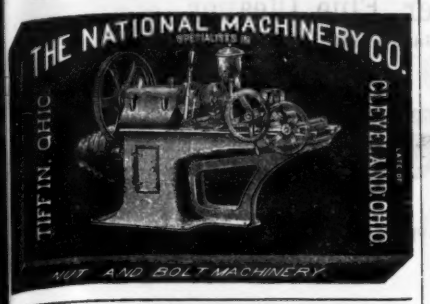

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BOILER CLEANER

AN AUTOMATIC DEVICE

FOR REMOVING MUD

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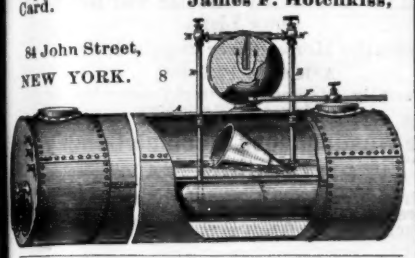
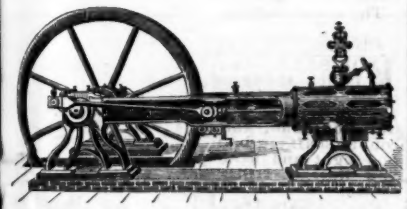


Sharp's



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Cut-off Engine

HAS NO EQUAL AS A FUEL SAVER.

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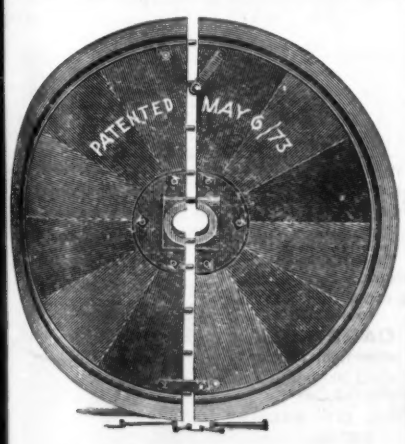

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MANUFACTURERS of Taper-Sleeve Wood Belt Pulleys. Taper Sleeve and Compression Couplings, Adjustable Dead Pulleys, Wood Pulleys Split or made in Halves, Friction Clutch Pulleys, and Friction Clutch Couplings. You can start a load with this clutch, at any speed, with ease and safety.

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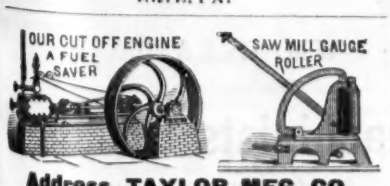
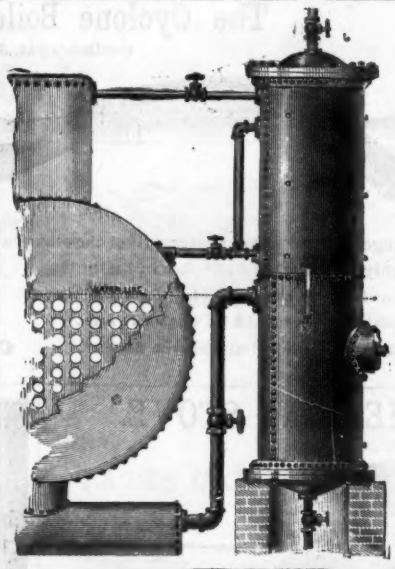


Address, TAYLOR MFG. CO.

(Please Mention this Paper.) Chambersburg, Pa.



Stillwell's Patent

Feed-Water Purifier,

(Patented March 13, 1883.)

ADVANTAGES CLAIMED FOR

STILLWELL'S FEED-WATER PURIFIER

OVER ALL OTHERS:

1. It does purify the feed-water and deliver it to the boiler freed from scale-producing elements and sediment.
2. It supplies the boiler with feed-water of about the same temperature as the water in the boiler, which at 90 lbs. pressure, is about 320°, thus preventing the danger arising from unequal contraction caused by injecting feed-water of a lower temperature than the water in the boiler.
3. It can be used equally well with all kinds of boilers, high or low pressure, and whether a steam engine is used or not.
4. It can be used to advantage following feed-water heaters of any kind.

Manufactured exclusively by

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Copper-coated Spun Zinc Ornaments

FOR GALVANIZED IRON CORNICE MANUFACTURERS.

Balusters, Urns, Finials, Sign Mortars, Bracket Fronts, Half and Whole Balls, etc.

Send detail Drawings by mail or express, at our expense, for estimates.

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Iron Roofing,

CHEAPEST AND BEST IN USE, AND

BEST IRON PAINT

for new or old buildings, of all kinds.

Manufactured by

T. C. SNYDER & CO.,

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The Griffin Road Machine Co.

MANUFACTURERS OF

Road and Track Machines,

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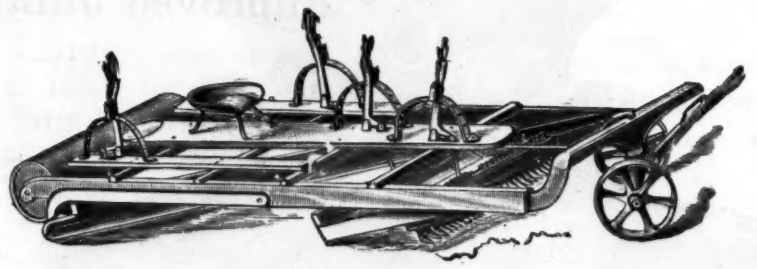


CITY SURVEYOR'S OFFICE,

LANSING, MICH., May 3, 1883.

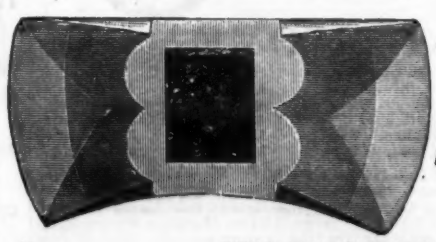
The Griffin Road Machine Co.

Gents.--We have had your machine running for a month, and are highly pleased with it. It has already more than paid for itself by the saving of labor.

H. D. BARTHOLOMEW,
City Surveyor.

22

C. L. JEFFORDS, Jamestown, N. Y.



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AXES AND EDGE TOOLS

C. L. JEFFORDS,
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CHUCKS

HARTFORD. CONN. U.S.A.

All sizes, Independent, 4-Jaw Combination Universal Geared and Lever. Brass Finishers' 2-Jaw, from 4 in. to 9 in. Chucks for Cutting-off Lathes Screw Machines, Amateur Lathes, Centering and Drill Chucks

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ILLUMINATI'G OILS, LUBRICATI'G OILS.

Naphtha & Gasoline.

Orders solicited in Bulk, Barrels or Cases.

Scofield, Shurmer & Teagle, 1

KEYSTONE SCREW CO.,
17th and Venango Streets,
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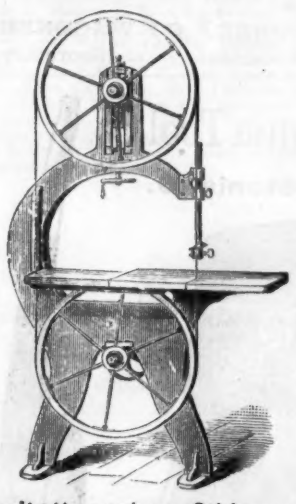
J. BILLERBECK,
Manufacturer of
Iron and Brass Gimlet-Pointed Wood Screws.
Ask for discounts.

Eureka Band Saw.



We build three sizes of this machine

with 26, 30 and 38 inch wheels.

The two smaller sizes will saw hard wood 12 in. thick, the largest 16 in. thick. They are made of the best material and are well made.

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Manufacturers of

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GEO. P. BURWELL, Gen. Agent.
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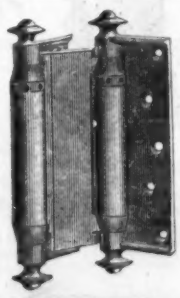
CLEVELAND, O.

A. C. CETCHELL,
9 Chief Inspector.



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SPIRAL SPRING HINGE,

has the lightest and

Most Elastic Movement

combined with

THE GREATEST POWER

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STEAM WATER & HAND POWER
GIVE HATCH SIZE, ELEVATION OF BUILDING, & SEND FOR ILLUSTRATED CIRCULAR
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☞ **These Coals are Pronounced Among the Very Best by M. C. Read, Assistant State Geologist, and E. W. Morley, Professor of Chemistry, Adelbert College.** 72

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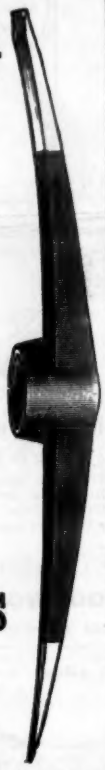
Leetonia, O.



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Mattocks, Sledges, &c.

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THE WATERS STEAM ENGINE GOVERNOR.

—The—
Only Governor Perfectly Suited to every Variety of Stationary and Portable Steam Engines.

Warranted to suit or no sale.

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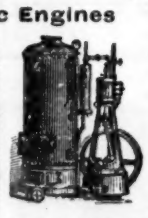
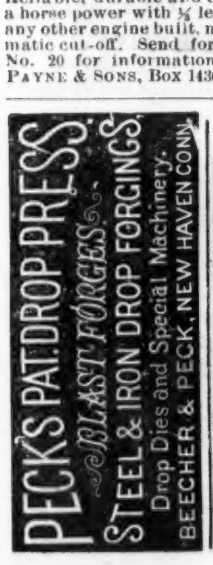
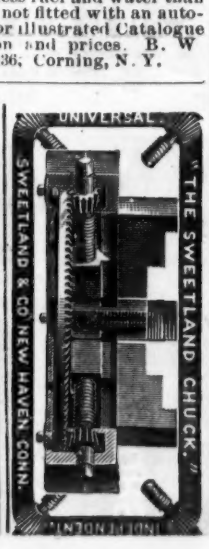
Established 1840.



Reliable, durable and economical, will furnish a horse power with ⅓ less fuel and water than any other engine built, not fitted with an automatic cut-off. Send for illustrated Catalogue No. 20 for information and prices. B. W. PAYNE & SONS, BOX 1436, Corning, N. Y.





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Construction Improved. Seven Sizes. 5 to 250 Pounds. Over 600 in Use. Price reduced March 1st.

The 15 and 25 pound sizes are specially adapted for Filemakers' use, the other sizes for general forging. Send for circular and references.

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The auger shaped steam passage gives the steam a spiral motion the entire length of tubes, thereby thoroughly cleaning a set of tubes in 5 minutes.

Improving the draft, saving fuel and labor.

No steam user should be without one.

Circulars free, liberal discount to dealers. 93

CRESCENT MANUFACTURING CO.
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THE CELEBRATED XX HEATING STOVE.

Manufactured Exclusively by JOHN RONEY, Hecla Foundry, Twentieth Street 12th Ward, Pittsburgh, Penn'a.

XX HEATING STOVE.

	Diam. of Bottom.	Diam. of Fire Chamber.	Height of Stove.	Weight.
No. 5, XX,	26 inches.	18 inches.	40 inches.	180 pounds.
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No. 8, XX,	36 inches.	24 inches.	53 inches.	540 pounds.
No. 9, XX,	36 inches.	26½ inches.	57 inches.	800 pounds.

Your attention is called to our CELEBRATED XX HEATING STOVE, which we guarantee is surpassed by none in the market for cheapness, durability, and heating purposes. It has been in the market for the past 16 years and has always given the best of satisfaction, and is particularly adapted for Hotels, School Houses, Churches, large Offices, Machine Shops, R.R. Depots, Round Houses, &c. The dimensions and weights are just as represented. Should you be in need of a large size heating stove we would specially recommend the Nos. 8 and 9.

Write for Prices and Circular of heating and cooking stoves. 15

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Portable and Stationary Engines and Boilers,

and all kinds of **Plate and Sheet Iron Work.** Also manufacturers of the

Celebrated Gladiator Agricultural Engine,

the lightest and safest engine built, having a perfect Spark Arrester. Send for Circular.

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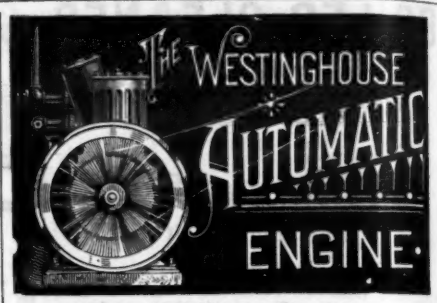

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And other light Forgings.

Weight 500 pounds. Send for Circular.

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SCREW LEVER

Dump and Coal Car.

(M. VAN WORMER'S PATENTS.)

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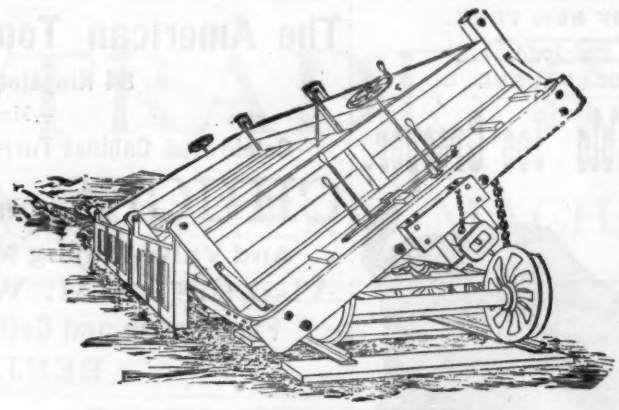
General Manager.



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AND CAN BE HANDLED BY ONE MAN,
DISCHARGING ITS LOAD INSTANTLY.

The device can be applied to flat cars. The car is under perfect control at all times, and can be held at any elevation or dumped suddenly if desired. For construction trains, cars with this device would be invaluable

The Mechanism is Strong, Simple and Durable

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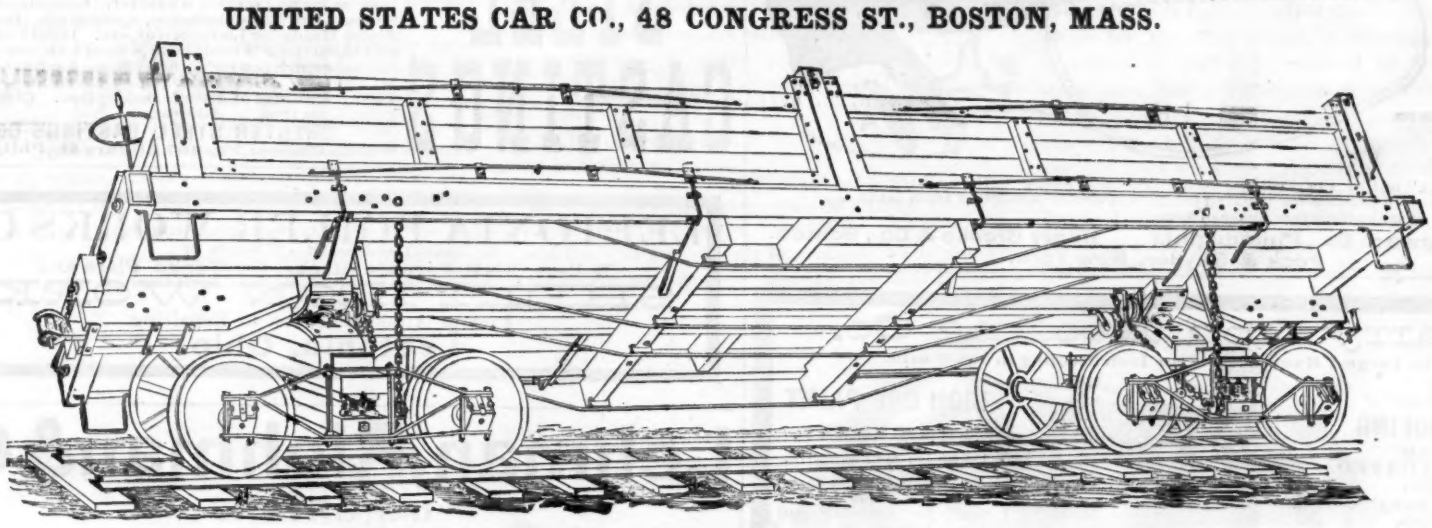
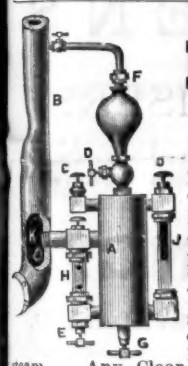


UNDERSIDE VIEW.

THE DETROIT

Lubricator Co.'s

SIGHT FEED LUBRICATOR CUPS.



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NOTICE.

The first lubricators ever made, showing the oil passing drop by drop through a transparent water chamber, were devised by us, and the same are fully embraced by many Letters Patent owned and controlled by us, which have been sustained in several hotly contested legal contests. Our customers, therefore, need have NO FEARS in their purchase and use. We are the sole owners of the "Sight Feed" feature as claimed by us, and we shall hold purchasers and users responsible who are encroaching upon our rights by the unlawful use of our device.

DETROIT LUBRICATOR CO.
Office 98 Griswold street, Detroit, Mich.

Note—In our recent suit against the American Lubricator Co., of Detroit, before Justice Stanley Matthews, of the U. S. Supreme Court, involving their "Sight Feed" feature, a decree was rendered in our favor August 20, 1881. (Mention this paper.)

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Stationary Engines.
Iron and Steel Boilers.
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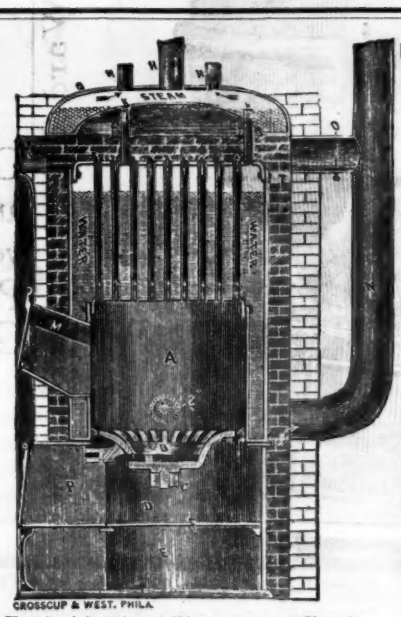
Threshers and Separators.
Cotton Gins

Send for Catalogue, and say where you saw this

FRICK & CO.,
WAYNESBORO, FRANKLIN CO., PA. 64



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CINCINNATI, OHIO. 24

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Car Wheels
all sizes and kinds, with and without Axles.

Chilled Faced R. R. Frogs.
STREET RAILROAD TURNOUT.
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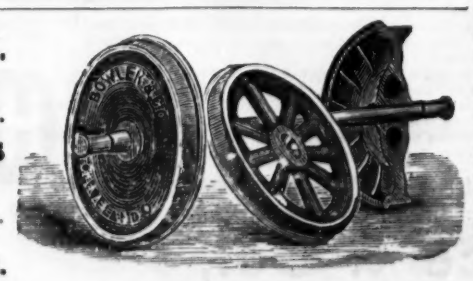

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Stove Work a Specialty.

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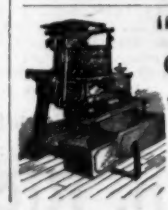
ROOM 15



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Corn-Mills and Millstones,
ALL SIZES.
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